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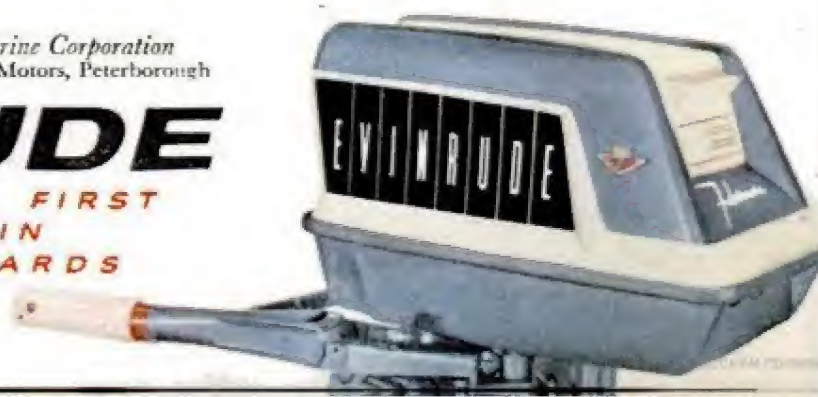
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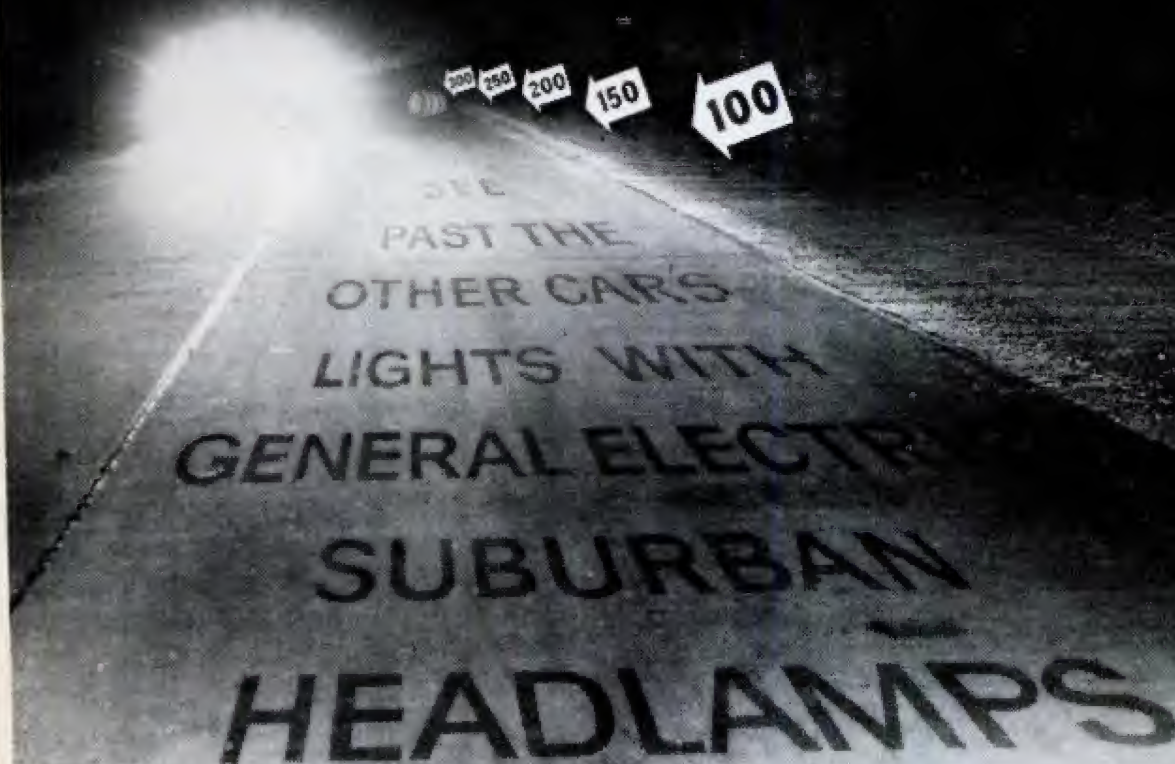
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Next Month...

WONDERING what to do about your vacation this year? A special 17-page section of the May issue is devoted to holidays galore—from 10 unusual vacations (we'll bet you've never heard of most of them) to "Tips on Tenting," vacation cabins, and what you can expect to find in driving the nation's toll roads. . . . Also in May, Valiant owners answer the question: How good can a compact be?

POPULAR MECHANICS

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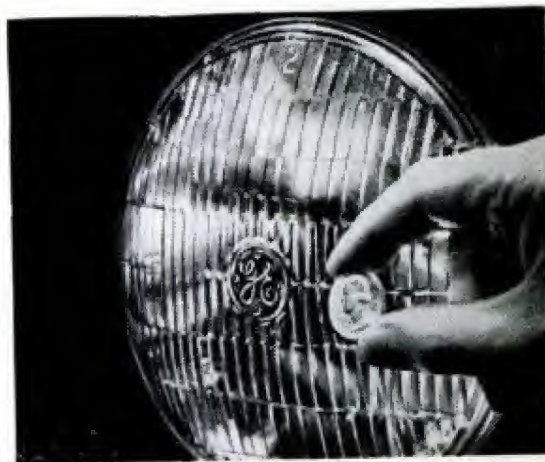
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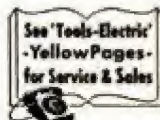
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Automobile manufacturers later adopted what they call *brake* horsepower—so named because they used a brake on the flywheel of the engine to measure horsepower. The method of measuring brake horsepower has undergone changes over the years, but the term is the one in everyday use.

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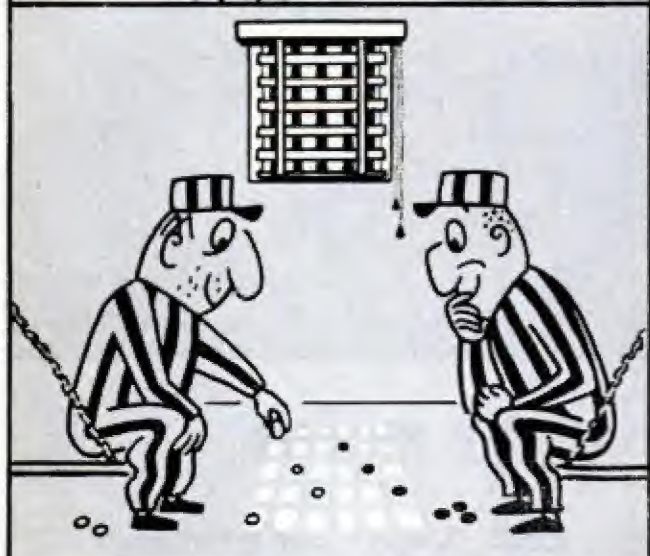
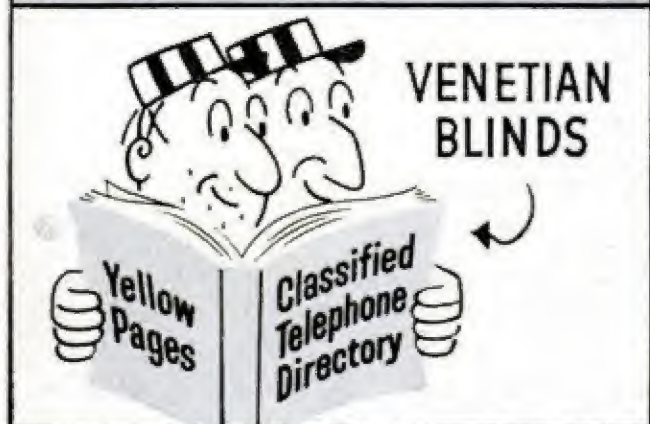
the engine's flywheel and therefore available to drive the car's wheels. The average American compact car engine has about 90 "horses," while the most powerful American car engine has about 350.

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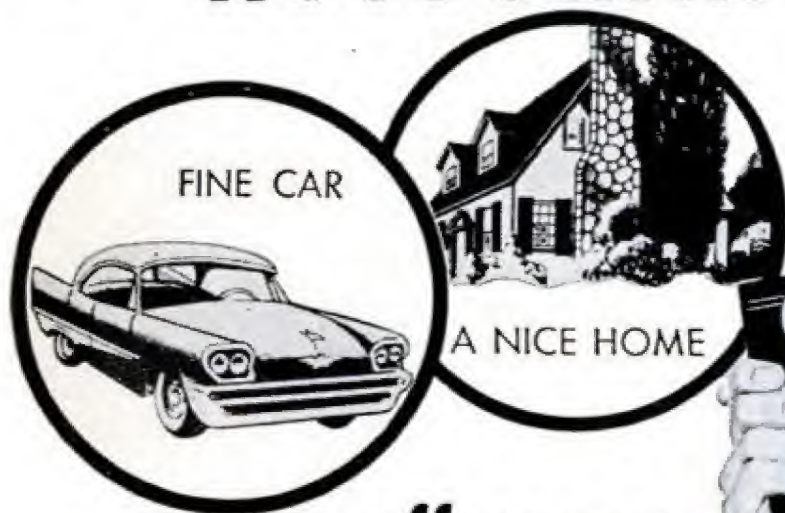
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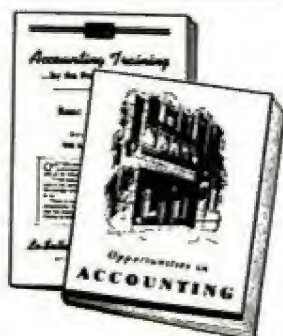
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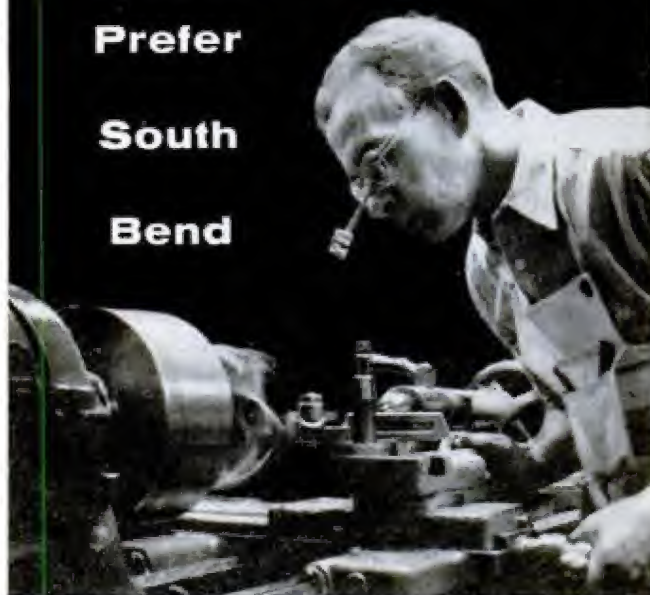


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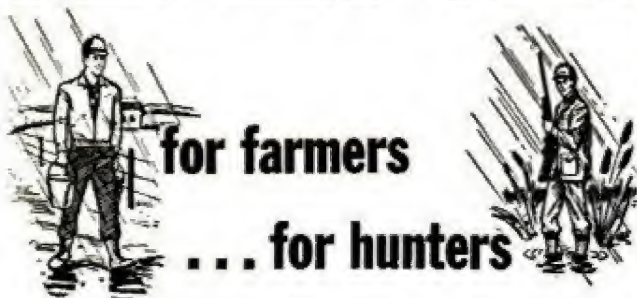
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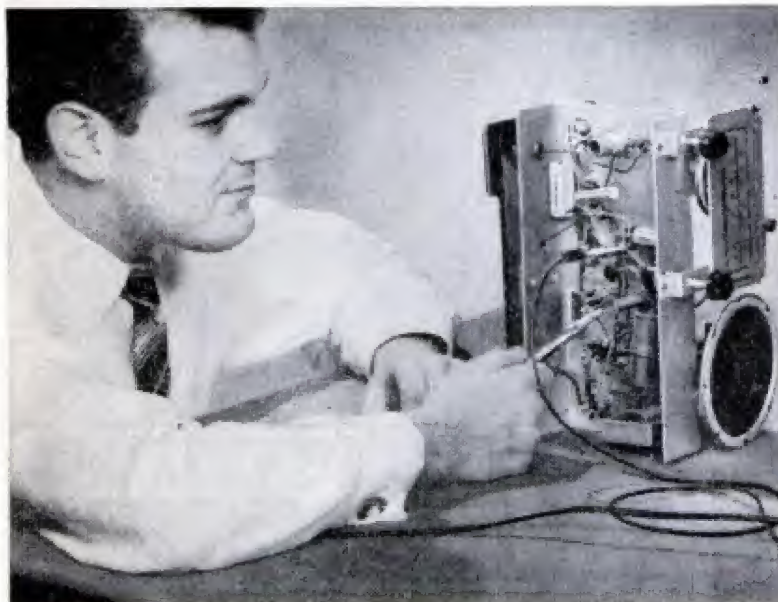
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NOTICE—It is the intention of this magazine to provide its readers with information regarding the latest developments in the mechanical arts. Except where otherwise indicated, this magazine has no information as to any unexpired patents in respect of the developments reported herein. In the event that commercial use is to be made of any of the developments reported herein, it is suggested that legal counsel be consulted to avoid liability for patent infringement. It is not the purpose of this magazine to encourage patent infringement but, as indicated, it is the intention of this magazine to report on the latest developments in the mechanical arts.

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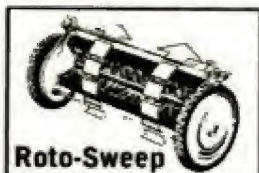


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Over the Editor's Desk



To the Editor:

Just thought you people would be interested in knowing that I built your original "Ranch-Type House." I first saw your house in *Popular Mechanics* in 1951. After looking and planning for some time we decided your build-it-yourself ranch-type house best suited us in every way.

About mid-1954 we got started. Just my wife and I, and what charitable help we got from friends. It was hard work all the way but I must admit I enjoyed every bit of it.



I am a machinist and toolmaker, my wife worked at the Naval Ordnance plant here in Macon. Late in 1956 she lost her job due to the recession and we moved into the uncompleted house about the same time. . . . We both love the house and have a lot of admirers of it here.

We made very few changes in the basic plans. For example, we brick-veneered the outside rather than using weather board. We just love the fireplace as originally planned.

George E. Mellinger,
2624 Reynolds Drive,
Macon, Ga.

☆ ☆ ☆

To the Editor:

Your article in the January issue on U. S. cars is great. In all this hullabaloo however I am wondering why "Willys" sleeps on. Their economy car was wonderful—it just came out prematurely—a 1960 model would go over big.

I drove to Toledo and picked mine up from the factory in December (the 1952 model). It cost me \$18.00 for gas to return home to Logan, Utah, a distance of 1800 miles. It rode like a Cadillac at speeds up to 90, consistently gave me 31 miles per gallon—was outstanding in every respect. Many of these '52 models are still around—

(Continued to page 16)

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still going great—and are right in style with all this "small car" fad. I traded my sedan in on a truck but during the 68,000 miles I had it, it gave me nothing but sheer pleasure to own.

I wish I had one now—my wife loved it too and we could use a second car now that we have five kids.

Reid A. Bench,
 Provo, Utah

☆☆☆

Correction

The statement made in the article "Sprung Doors" (January 1960) that the doors of convertibles and hardtops will be sprung when such cars are placed on a frame-contact hydraulic lift has been brought to our attention as being incorrect. The process of lifting a car does not create any permanent condition which would affect the alignment or operation of doors. While exceedingly minor deflections do occur at the door gaps of convertibles and hardtops when raised on frame-engaging-type hoists, these deflections are canceled, immediately and permanently, as soon as the car is lowered. It has been further pointed out that all automobiles are built to withstand deflections and bending movements, and that ordinary driving conditions and the use of bumper jacks often impose stresses and strains even greater than those which result when the vehicle is raised on a hoist.

☆☆☆

Twin-Pontoon Rescue Boat

From Lt. R. N. Ireland of the 3001st Radio and Rescue Detachment, Texas State Guard Reserve, comes this report of a rescue boat built from two jet-fuel tanks by men who had never before built a boat. The six men accomplished their job without plans, at a cost of \$60, using only hand tools and drills and an acetylene torch.

Carrying five men, the craft has a draft of about six inches; without its crew, only four inches. With a 25-horsepower motor, its speed on a Texas river approximates 20



(Continued to page 18)

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miles per hour, or 15 mph with five men aboard. This in windy, choppy water. Lieutenant Ireland writes that the catamaran can change direction in its own length at full speed and open throttle.

Using two 450-gallon jet-fuel tanks, the two cockpits were cut out in each tank and an aluminum "I" beam removed from the inside of each was used to connect the two pontoons together. Connector plates of 1/2 x 4 x 12-in. steel were heated with a torch and hand hammered to fit the contours, bolted through the pontoon body at positions where each was clamped through the "skin" of the tank and through the heavy inner baffle-plate edges. Three connectors were used, each double-coated with rust-preventive paint and bolted on the wet second coat over a latex rubber gasketing. Bolts through the hulls are the original aircraft bolts.

Separated by a deck 4 1/2 feet wide and 10 1/2 feet long, ample space is allowed for working area. The underside of the I-beam cross members has been fitted with a plywood bottom that curves from the front cross-member (2 by 4 oak) back under the beams and is fastened to the transom. Edges were hand fitted and rubber gasketing seals the edge at hull side.

Transom is 2 by 8-inch oak on a welded bracket.

Removable front deck section allows storage of lines and some tackle essential to normal operation but which must be placed out of the way during assigned operations. Cockpits allow operator to maneuver the craft without interference from crew. Other openings allow storage of rope, drags, portable light plants of 6 and 24 volts, floodlights, extra gear necessary to emergency work and comfortable ride to and from the work area for the crew. "Scuba" equipment also rides inside the hulls.

Says Lieutenant Ireland:

"Built strictly for rescue and recovery work of water accidents, tests on Falcon Lake in high wind and waves prove it a stable and well-mannered boat with sufficient room for working crew and operator. It handles well, carries more than enough gear that is out of the way at all times when not in use and is far safer for such work than ordinary single-hulled boats usually so employed."

☆ ☆ ☆


JAMES R. WARD, Shop Notes and Crafts Editor of *Popular Mechanics*, died recently. Over a span of 15 years in this position, Jim earned a notable reputation, and his work will be missed, not only by his friends here, but by contributors and readers everywhere.

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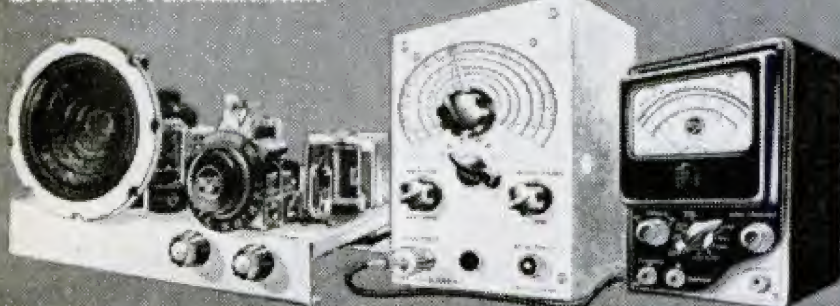
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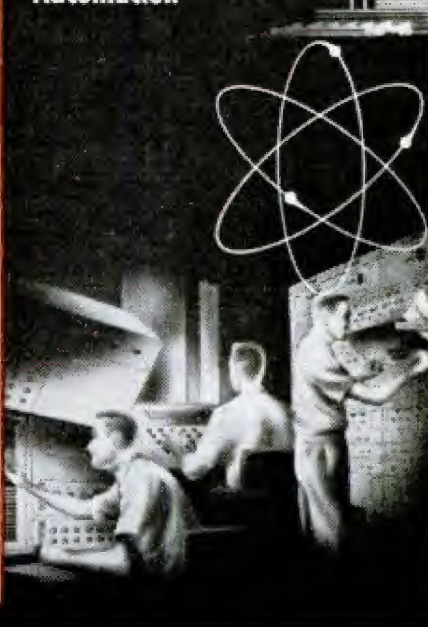
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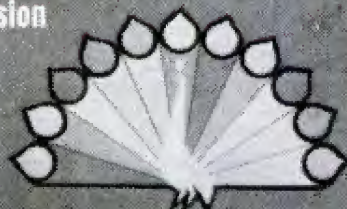
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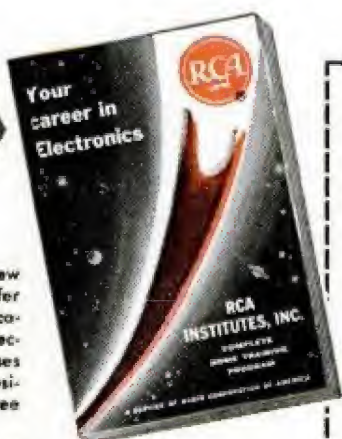


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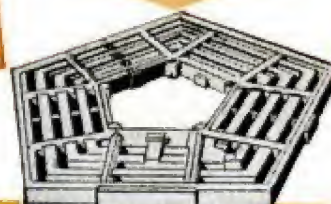
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Sidelights from the PENTAGON

By William R. Kreh

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Four representatives of another World War II institution—the huge Mars flying boats—have been saved from the junkpile and are being outfitted to fight forest fires in Canada. Lumber firms are rigging them to scoop up 35 tons of water at a gulp while skimming over the surface of British Columbia lakes. It is proposed that the planes will then fly above forest fires and dump their cargo of water in a matter of seconds. Water tanks, to be installed in the main cargo section of the planes, between the 200-foot wings, will have hydraulic doors controlled by the pilot, who'll be able to select the amount of water he wants to drop.

A 67-year-old English woman, Mrs. Edith Hurry, who had been confined to a hospital bed because of low blood pressure, is walking again—thanks to a jet pilot's "G-suit" which was donated by the U.S. Air Force's 20th Tactical Fighter Wing. Dr. William Stanford, a flight surgeon, zippered Mrs. Hurry into the green, tight-fitting outfit and she was able to stand—for the first time in six months—without losing consciousness. The suit applied pressure on her abdomen, thighs and calves, maintaining blood pressure and circulation, and keeping blood from leaving her head when she stood. The "G-suit," incidentally, had withstood the brunt of as much as 7-Gs while being worn by American jet pilots.

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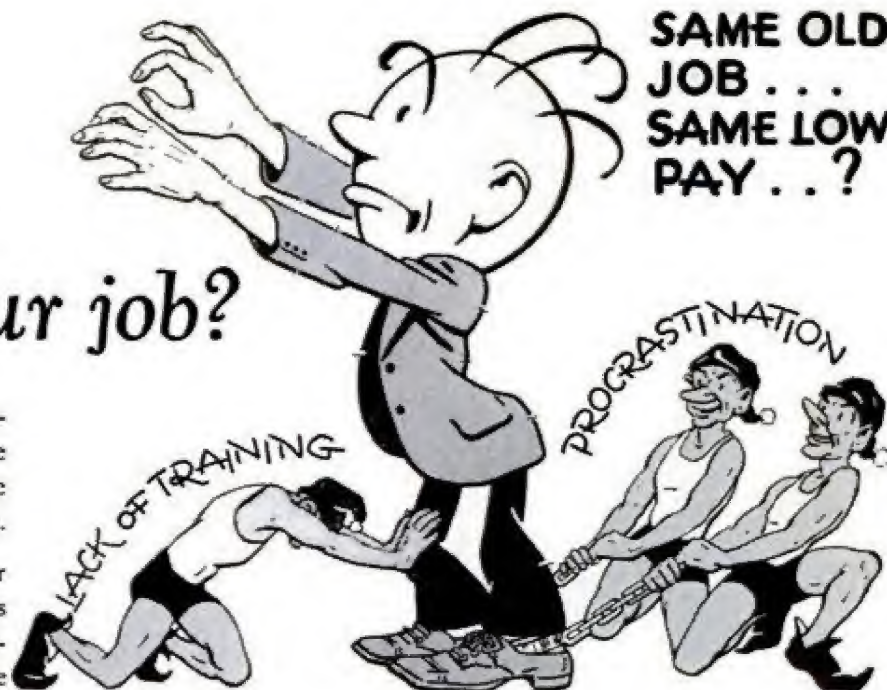
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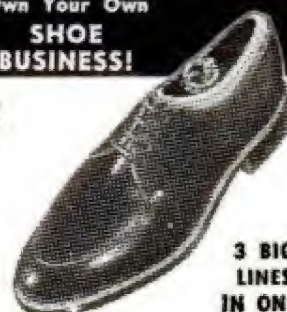
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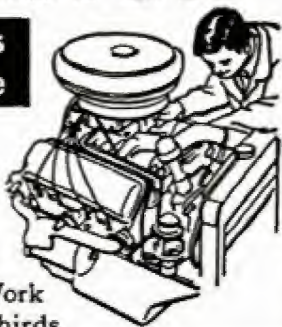
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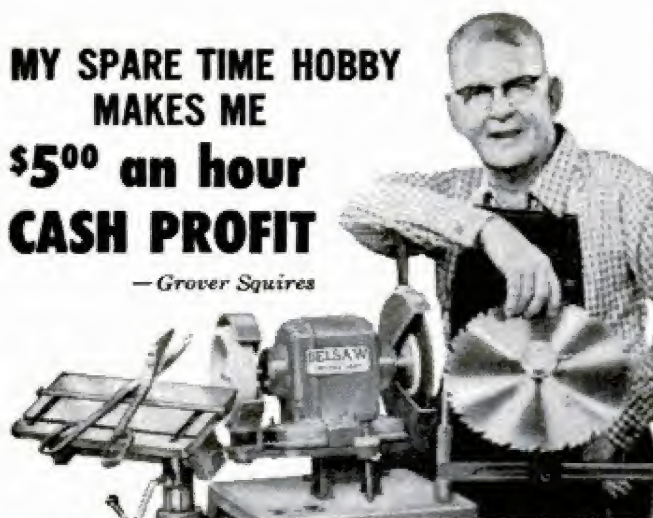
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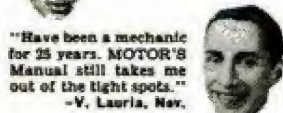
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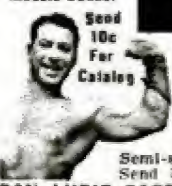
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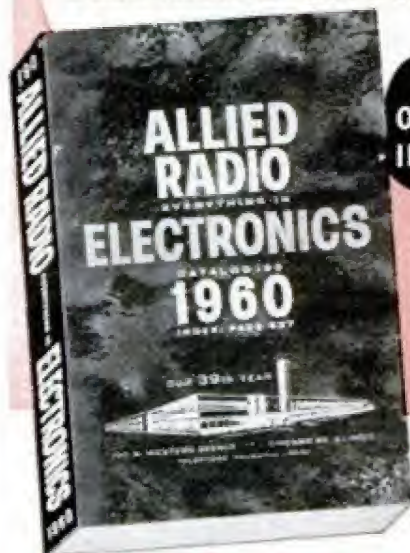
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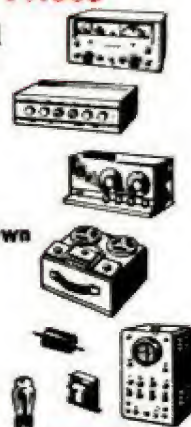
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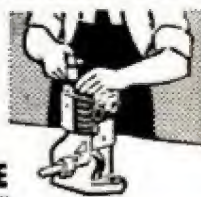
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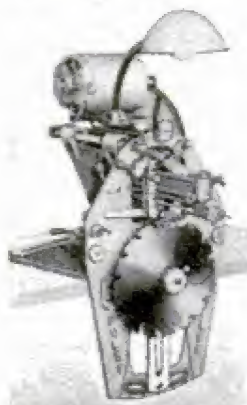
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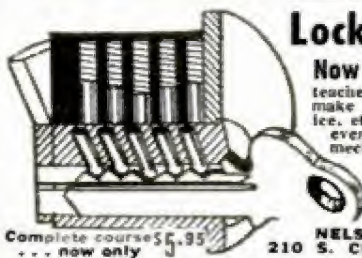
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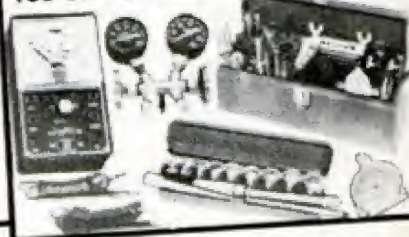


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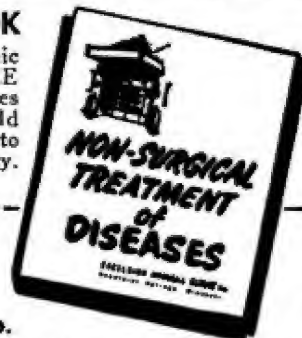
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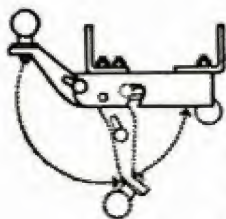
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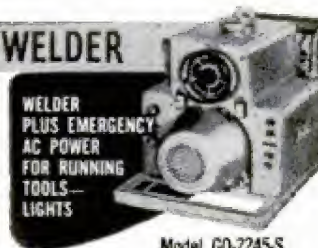
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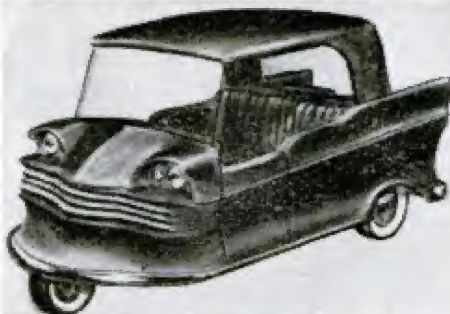


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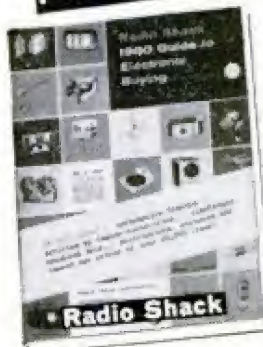
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If we are ever to tame the "ocean at every man's door" through weather modification, we must first change our methods of experimenting with the atmosphere. This is the substance of a report issued by the National Academy of Sciences — National Research Council.

In stressing the need for fundamental understanding of atmospheric processes, the report distinguishes between experiments designed to produce basic data and experiments designed to produce rainfall. Acknowledging that cloud-seeding efforts during the past decade have contributed to our knowledge of weather phenomena, the report points out that they have also led to many "false starts" and that "the economic value of obtaining even a small degree of control over rainfall has created undesirable pressures which have tended to dilute the scientific quality of some weather-modification experiments."

The value of rain-making experiments of a scientific nature is recognized in the report. Here, perhaps, lies the key to unlock the entire mystery of energy balance in weather systems—providing man with the ability to control not only rain and snow, but also hail, lightning and violent storms. Therefore, the report asserts, financial support of weather modification experiments should be channeled into investigations of relevant basic atmospheric processes and modification techniques, using scientific methodology and modern principles of experimental design. Other points made in the report are these:

1. Laboratory and field studies should be carried out by an individual or small group. Although such projects will be largely exploratory, any promising results can be given large-scale experimentation.

2. Statisticians must work with meteorologists to provide sound statistical methods.

3. Where effective cooperation exists between meteorologists and statisticians in universities and research institutions, it should be strengthened.

4. Few U.S. experiments have been carried out long enough. Most field experiments must go on for several years.

5. Experiments must be repeated in space as well as in time, and improvements must be made in measurements, instrumentation and in standardizing terminology.

6. Basic research programs in atmospheric physics, chemistry and electricity should be considerably augmented. Laboratory studies should include solid-state physics, crystallography, surface chemistry and electron microscopy.

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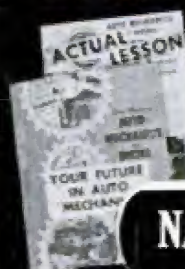
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Tom McCahill Reports on: *Heavier, More Durable Muffler Construction*

You hear a lot of bellowing from car owners about how often mufflers have to be replaced on modern cars, and they have some grounds for beefing, for the typical muffler only lasts 6 to 18 months. Mufflers are pretty perishable items today, due to stepped-up compression ratios, higher horsepower, and high-octane fuels.

The thing to look for in buying is thicker, heavier coated steel. Even this will wear out, but it takes longer than the thin-skins. You don't have to have a sheepskin from M.I.T. to figure out that thicker steel will take longer to rust through. This is only one indication of muffler quality, but an important one. Oddly enough, cars run only occasionally for short distances use up mufflers twice as fast as police cars and trucks under constant use, because the harder-working mufflers dry out the corrosive condensate that continually eats away the shell. All mufflers rust from the inside—not the outside.

Next time you need a replacement, look up your AP dealer. AP mufflers have much thicker shells and heads than other brands. Heft them, and you'll feel the difference. AP mufflers weigh several pounds more than would-be rivals. Tie this up with rust-resistant coatings and with their exclusive "Dri-Flow" design, which keeps AP sound-busters drier inside, and your muffler problems will be over for a long time—and they don't cost a dime more than ordinary thin-skinned jobs.

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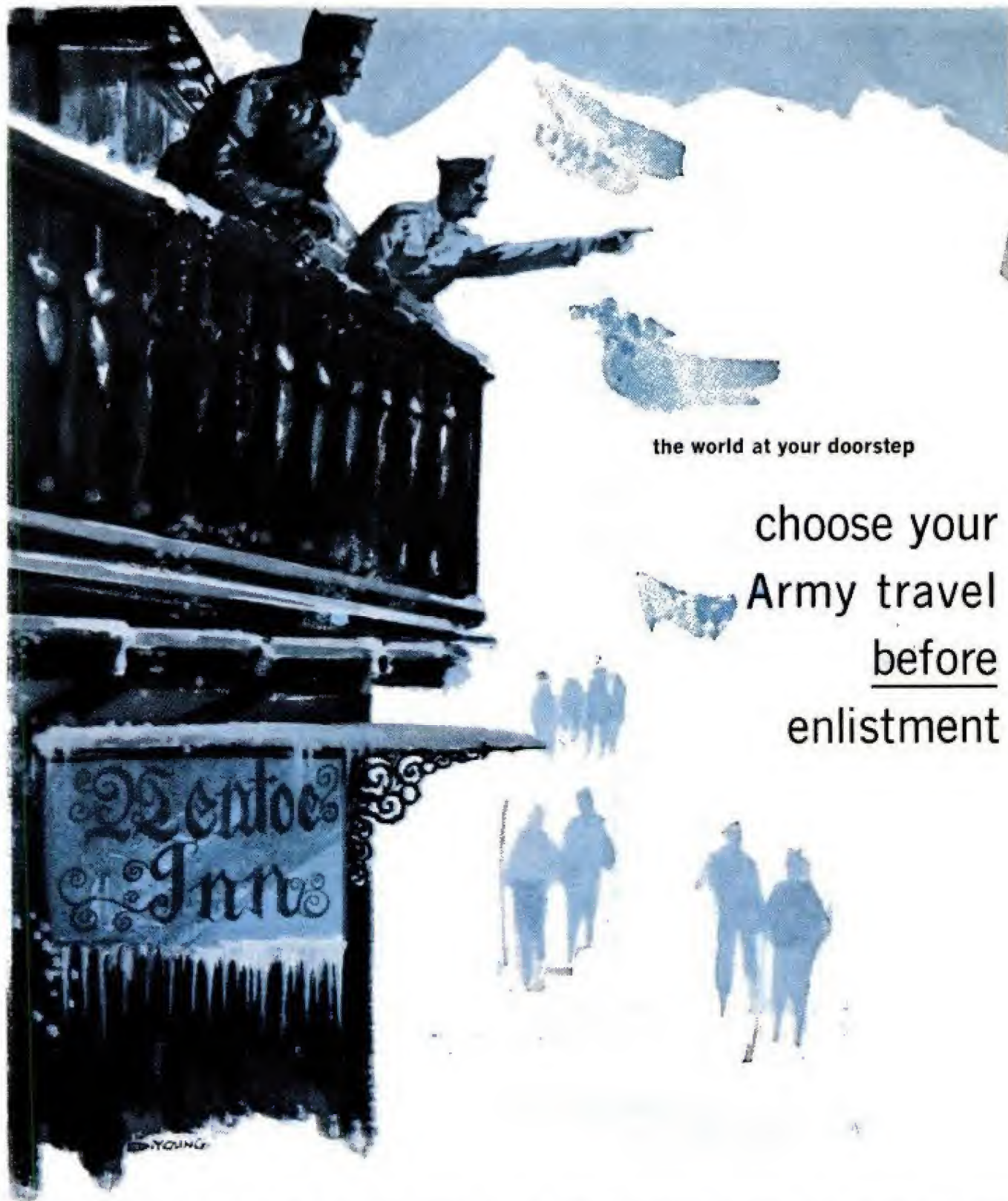
Designer A. L. Smith with a section of his breakwater



Breakwater model in surf shows wave-deflecting action

Ramp on Raft Breaks up Waves

Offshore oilmen, dredgers, dockmen and shore construction men may soon be using a portable, self-anchoring breakwater to control wave action without building an entire breakwater around their operations. Designed and developed by A. L. Smith of the Petroleum Instrument Co., of Houston, the "Sea Raft" is 38 feet long, 15 feet wide and 9 feet high, but can be used to break seven-foot waves in 15 feet of water. In use, the buoyant rafts are towed into position and sunk, usually in long rows, at right angles to the current or wave direction. The incoming water mass climbs the inclined surface to a height where gravity offsets its forward motion, and at the same time its weight presses the structure downward with a force greater than the wave's horizontal impact. The "raft" is held in place by the waves that it stops. After use, the structure can be refloated by applying air pressure to fill the base tubes and can be towed to a new location or, since it will float in as little as 24 to 30 inches of water, it can be beached for storage or repair. The big value of the "raft," of course, is its ability to protect construction or military operations from wave action which can make work difficult or impossible if the waves become higher than four feet.



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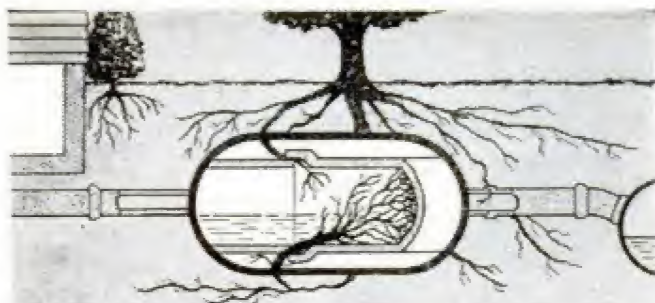
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Spotlight on the

English Ford Anglia

By Art Railton

GONE IS the stiff, proper look. Relaxed a bit is the Episcopalian posture. The all-new Ford Anglia is stylish enough that women call it "cute," something they never did before.

Viewed in profile, its reverse-slanted rear window gives a pertness, a tailored, tweedy look that combines novelty with neatness.

The reverse-slant window has several practical advantages as well. It doesn't collect ice and snow. It allows a larger trunk opening. It keeps the sun off the shoulders of rear-seat riders. And it increases headroom in the back seat. Its only disadvantage seems to be the elimination of the shelf behind the rear seat (a disadvantage that is a benefit in terms of safety).

But Anglia's changes are not only in looks. Mechanically, it's new as well.

The new overhead-valve engine has a stroke so short that piston travel per mile is under 1200 feet, making it less than Volkswagen's (always considered lowest in this department). Low piston travel per mile means less wear, longer engine life. Even when wide open (slightly over 70 miles per hour), this short-stroke engine won't be overworked.

Behind the new engine (which looks so small tucked as it is deep in the hood cavity that you wonder if there isn't more somewhere) is an equally new four-speed transmission. Previous Anglias have had a three-speed gearbox. The added ratio is a blessing. Third gear gives a valuable pass-

Both in looks and performance, the Anglia is all new



(Continued to page 72)

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Fins, reverse-slant rear glass, all for only \$1583

ing kicker which is desirable with this engine size. You can run up to 60 miles per hour in third for quicker passing. Using third, it accelerates from 40 to 60 in 20.6 seconds, a noteworthy performance for its 61 cubic inches. Surprisingly quick at the stop light, the car gives the alert and eager driver enough pep to keep up with normal traffic situations.

From 0 to 60, the Anglia ticks off 29.1 seconds. From 0 to 40, the average is 10.6 seconds. Both are satisfactory times for an economy car.

Okay, then, what about economy? Here is a true economy car. You don't have to feather-foot it to get 30 miles per gallon. Even the most abusive, kick-it-in-the-pants driver will do better than 25 miles per gallon. In one winter test, with temperatures ranging from 5 to 15 above zero, the Anglia averaged 28.0 miles per gallon in a series of short "hacking" trips, similar to those a housewife would take in a normal day. Included were many cold starts with choke operation. Even so, economy was good, as the 28 miles per gallon indicate.


Country-road fast driving resulted in 31.5 miles per gallon. Included were long stretches at 65 miles per hour. Careful, more temperate driving would boost economy to 35 miles per gallon (even more in warm weather).

Handling is excellent with steering being light, fast and precise. The floor-mounted shift lever is close at hand and a pleasure to use. Action is direct and accurate with no concern about where you might end up. There is no tricky stickum to master, no temperamental quirks to humor.

One minor problem is the odd-ball reverse-gear location (you lift up and pull back). It may make things a bit complicated for unfamiliar (if such exist) park-

(Continued to page 286)

**HERB SCORE, Cleveland
Indians pitcher, says:**

**"The best friend in
my home shop is a
tube of 
PLASTIC ALUMINUM"**



"Of all the fix-it products I've tried, Duro Plastic Aluminum wins my vote . . . it saves me time and money," says Herb Score, front-line pitcher and strike-out specialist for the Cleveland Indians.

Off-hours, family man Score likes to relax in his well-equipped home shop. Equipment always includes a tube of Duro Plastic Aluminum. Metal in putty form, Duro Plastic Aluminum fills, seals, solders, repairs—adheres to virtually any surface.

Made with ALCOA® Aluminum Powders by Woodhill Chemical Co., Cleveland, Ohio, Duro Plastic Aluminum is applied like paste, dries metal-hard in three hours. Users say it fixes anything.

ALCOA does not make aluminum putties, but ALCOA Aluminum Powders are used in all the best brands. Cold solders are easy to use, require no tools, heat or flame. They adhere to metal, wood, plastic, glass or concrete . . . are not affected by water, oil or gasoline . . . can be burnished to a high luster or even painted. Write today for more information. Use the coupon.

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DURO PLASTIC ALUMINUM
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HUNDREDS OF USES
For the Home, Auto,
Boat and Shop.


SEAL and SOLDER
Leaky Gaskets and
Drainpipes


REPAIR Holes and
Leaks in Pans,
and Fills


REPAIR Holes and
Leaks in Wood and
Metal Boats


REPAIR Holes and
Leaks in Laundry
Equipment


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Leaks in Auto Bodies

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Fleet Operators Invited!

Multi-unit operations can be supervised with hired management, and a working capital of \$20,000 should earn \$25,000 to \$30,000 the first year!

Mister Softee.
INC.

Dept. PM-1
Runnemede, N.J.

Do You Know This Old-Timer?

(answer to quiz, page 12)



1905 Cadillac

French Inventor Wins Patent Suit Against United States Government

Raymond Saulnier, French inventor of the cockpit canopy ejector for airplanes, is entitled to collect damages because the U. S. government infringed his patent, according to the United States Court of Claims. Saulnier filed his suit against the government five years ago, estimating he was owed at least \$5 million.

The Court recently ruled that his patent was infringed every time a Thunderbolt, Thunderjet, Mustang, Scorpion, Fury or Sky Raider was built, between Dec. 9, 1948 and Dec. 9, 1954. The device may have been used on other planes; if so, Saulnier is entitled to collect for those uses as well, said the Court.

The government's defense was that Saulnier did not invent anything, that the elements he put together were old and the result was obvious to anyone skilled in working with them. But the Court said inventors had been seeking such a canopy for years. It needed two mechanisms: one for sliding the roof back and forth, the other for detaching it completely in emergencies. The court said that Saulnier had produced "something no one else had been able to do."

In making the decision, one judge pointed out that the British government has bought a license from Saulnier to use his invention, and that the French government—under an international agreement to pay a citizen's claims against another country—had paid him for 31,000 canopies used on American planes in World War II.

Helicopter With Depth Finder Scouts for Fishing Fleet

Trailing the microphone of a depth-sounding instrument in the water 50 feet below, a helicopter is leading the boats of Russian fishing fleets all over the world with deadly accuracy and at speeds up to 10 miles an hour. The same instrument and methods are used as with shipboard installations, but the whirlybird covers much more area, doesn't scare the fish, and can operate over rougher water than any boat and still give accurate readings. The sound projector, or microphone, is towed at a depth of about 20 feet under a streamlined float. A wire from the float leads to the instrument panel inside the helicopter. The operator communicates with the fishing fleet by radio. The instrument reports the size and shape of the schools of fish, their depth, and even the species of fish found. The boats can set their trawls or seines accordingly.

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ALUMA Craft

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Please send new 1960 Boat Selector catalog including specially designed fishing fleet.

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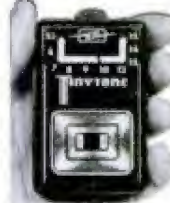
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DART 905—America's fastest selling reel with no line twist and factory pre-set drag... yet it's adjustable. All metal gears. Anti-reverse crank. In black and gold. Comes with 10 lb. test monofilament line. 7 oz.
Only one of 25 Bronson quality reels. Sold everywhere. . . . **\$5.95**

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PAPERWOOD HAULER: James O. Clark, Butler, Ala. "Only Firestones can take the severe abuse of pulpwood hauling!"

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From tire-walloping haul roads to high-speed turn-pikes, Firestones prove their superiority best where trucking is toughest. And 425 million grueling tire test-miles every year are behind such Firestone "extras" as Shock-Fortified cords and Firestone Rubber-X, the longest-wearing rubber ever used in Firestone tires. That's why, when your profits depend on truck tire performance, it pays to depend on Firestones for proved low cost per mile and on-time deliveries. Get all the facts about Firestone truck tires from your Firestone Dealer or Store.

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*Firestone T.M.

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Firestone truck tire
performance!*



MILK HAULER: Dale Heckber, Ossian, Indiana. "Milk won't wait on truck tire troubles. That's why I depend on Firestones. I've been buying them for 25 years!"



STEEL HAULER: Peter Hartman, Lorain, Ohio. "For 'pike runners, or on any road for that matter, I can't beat Firestone truck tires for wear. I run on them 100%!"



FOOD PROCESSOR: John Carroll, Milwaukee, Wisconsin. "We count on Firestones 100% to stop costly truck tire downtime and keep our food moving expenses in line!"

WHAT SECRET POWER DID THIS MAN POSSESS?

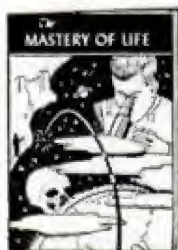


BENJAMIN FRANKLIN
(A Rosicrucian)

WHY was this man great? How does anyone—man or woman—achieve greatness? Is it not by mastery of the powers within ourselves? Know the mysterious world within you! Attune yourself to the wisdom of the ages! Grasp the inner power of your mind! Learn the secrets of a full and peaceful life!

Benjamin Franklin—like many other learned and great men and women—was a Rosicrucian. The Rosicrucians (NOT a religious organization) first came to America in 1694. Today, headquarters of the Rosicrucians send over seven million pieces of mail annually to all parts of the world. Write for YOUR **FREE COPY** of "The Mastery of Life"—**TODAY**. No obligation. No salesmen. A non-profit organization. Address: Scribe N.B.X.

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Tunnels Permit Tiny Eels To Swim up Rhine

Engineers building 17 huge sluices that will pour 60 percent of the waters of the Rhine River into the North Sea near Hellevoetsluis, Netherlands, are making sure that millions of eels—about one-third of an inch long—can pass, easily, from the sea and go upriver to their feeding grounds.

Instead of opening the massive sluice gates, each weighing some 425 tons, which would allow torrents of water to pour inland, the engineers are building small tunnels through the sluice piers which can be opened and closed at either end to permit passage of the tiny glass eels with a minimum of water.

This extra work is necessary because the eels, one of the Netherlands' most succulent delicacies, provide a livelihood for several hundred fishermen. Born in the Sargasso Sea off the U. S. coast, the eels make their way to Europe, where they grow to full size before returning to the Sargasso seven years later to breed and die.

The sluice engineers took this cycle into account because, in 1932, a group of dam engineers did not. Then, another huge project, the closing of the Zuider Zee against the North Sea by a 20-mile dam was completed. It was soon discovered that each spring the water in front of the dam literally shimmered with millions of baby eels, and that eel fishermen were having poor catches.



"Whatcha doin', building a boat?"

"I 'built' my Chevy to take a hint—automatically!"

"You'd be surprised what two big brothers can teach a girl about cars—especially when they're automobile engineers. So when I went down to buy my new car, I knew what I wanted: an absolutely automatic car, one that would do everything for me short of driving itself.

"Thanks to Chevy's list of options (longest in the business, my brothers say), I've got that dream car parked in front of my apartment house.

"Naturally, it's an Impala Sport Coupe. (I happen to be a fashion model, so style is extra important to me.)

I wanted V8 smoothness with the economy of a 6—and Chevy's economy V8 is just the thing. And I let Turboglide* do my shifting for me. Power steering* and power brakes*, of course, and then Chevy's six-way power seat*. Power windows* are a touch of luxury I wouldn't miss for the world. Why, I've even pampered myself with a power radio antenna* and a power ashtray!* (Those Chevrolet people think of *everything*.)

"Cars just don't come much more automatic than mine. And even though my brothers are mad about

sports cars, I notice they get a real charge out of driving my four-wheeled robot."

This is just one kind of Chevrolet. There are as many other kinds as there are people: heavy-duty work-horse wagons, outright thrift cars, cars that move in utter splendor. The point is this—you can virtually custom-build your Chevrolet to suit yourself. We'd suggest a trip to your nearby Chevrolet dealer's soon. . . . Chevrolet Division of General Motors, Detroit 2, Michigan.

**Optional at extra cost.*



Got a good idea of what you're after in a car? Chevy lets you choose from seven engines, five transmissions, regular or Positraction rear axles, special cams, solid or hydraulic valve lifters . . . the widest choice of options in the industry. And that means you can "build" your personal car to fit you like a glove.

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Rhine Suspension Bridge Hangs From Single Tower

When the city fathers of Cologne, Germany, decided five years ago that a new bridge across the Rhine was needed to divert some of the traffic from the five bridges already within the city's limits, they also gave their director of construction, Karl Schuessler, definite instructions on how *not* to build it. The bridge, they said, should not obstruct the view of the city's celebrated Gothic cathedral, nor should it tower above the cathedral's spires. As a result, the bridge, which opened for traffic last November, is perhaps the longest single-tower suspension bridge ever built. Schuessler decided its single, 255-foot, A-shaped pylon should rise on the right bank of the river (the cathedral is on the opposite bank), from where it supports the 996-foot main center span with six light steel cables fastened at intervals along the structure. Named after St. Severinus, the bridge is as austere in its modern conception as the twin spires of the still-plain-to-see cathedral are ornate.

Construction director Schuessler thus maintained the Gothic beauty of the river town founded by Julius Caesar, but he posed problems for Chief Engineer Gottfried Vogel. In order to lay the steel, Vogel first sank a concrete caisson 20 feet below the bed of the Rhine and 400 feet out from the right bank. On this he erected the steel A-frame. Successive temporary caissons were built in the middle of the river to support the bridge until the supporting cables were woven and attached. The length of the bridge, from pier to pier, is 1488 feet. It stretches 2280 feet overall, from midtown Cologne to the industrial suburb of Deutz. The bridge itself weighs 8244 tons, with the cables—the heaviest of which is 16 inches in diameter—counting for 600 tons. It is 98 feet wide. A double streetcar track runs down the center. On either side are double automobile lines, a bicycle track and a 10-foot-wide pedestrian walk. The St. Severinus bridge cost the equivalent of \$14,000,000 to build. It will be operated toll-free.

QUOTE:

"What non-scientists do not realize is that science is fun, that there are few, if any, emotional experiences so profound, so satisfying, so beautiful, as seeing a pattern where there was none before, as finding an answer to a question asked long ago, as finding a new question to ask."

—DR. ANNE ROE,
Harvard Researcher

POPULAR MECHANICS



HOW EASY TO BUILD YOUR OWN PATIO!

Saw, drill, nail and install translucent Alsynite panels with ordinary workshop tools. No painting, no care needed with shatterproof Alsynite. Just enjoy it! Alsynite's exclusive heat-block, Filtron 25, cuts up to 90% of the sun's heat. And Superglazed Alsynite is guaranteed in writing to maintain color, texture and strength for 10 years. Now available in exciting new Ridgeway line as well as corrugated and flat. Write Alsynite Company of America, Dept. PM-40, San Diego 9, Calif. for free detail sheets. Or look under "Plastic Products" in the Yellow Pages.



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Power!

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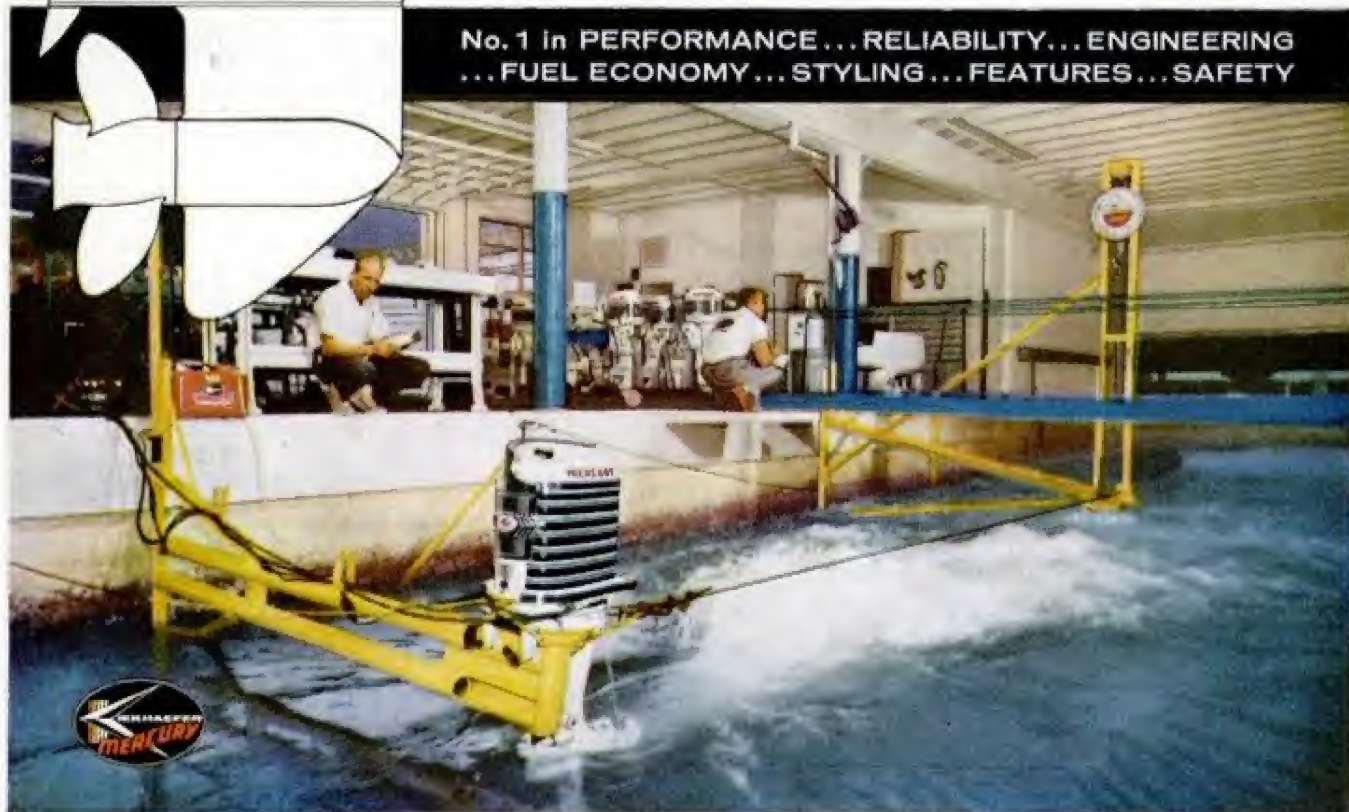
The reason is Mercury's modern *in-line* engine design, with smaller, lighter, tougher reciprocating parts and much lower piston speeds than long-stroke "big-bore" engines. Mercury's small-bore, short-stroke design not only develops usable power throughout a wider speed range but reduces inertia forces — the main cause of engine wear — to only about one-third those of competitive outboards operating at the same RPM! The result is bonus power and performance with longer engine life. See your Mercury dealer for a demonstration of power no other outboards can touch — 6 to 80 hp, in twins, fours and sixes.

Write for free booklet, "An Introduction to Outboarding".

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Below — Static thrust testing proves that a Mercury can lift five times its own weight!

No. 1 in PERFORMANCE... RELIABILITY... ENGINEERING
... FUEL ECONOMY... STYLING... FEATURES... SAFETY



TWENTY MILES from Tombstone, Ariz., at an old cavalry post named Fort Huachuca, the United States Army is testing the electronic weapons it will use in the future.

Eighty years ago the troopers at the fort flashed news of Apache raids by heliograph; today the technicians at the huge 160-square-mile Electronic Proving Ground are using single sideband circuits, infrared and even radio reflections from the ionized trails of meteors for communication between units or around the world.

The remote location in southern Arizona was chosen partly for secrecy, partly because the region is one of the best "electronic vacuums" that the Army could find. There are no powerful commercial transmitters in the surrounding desert, no big TV stations that might interfere with the accuracy of the tests.

The 7500 military and civilian technicians under the command of Maj. Gen. Francis F. Uhrhane are not only testing improvements on present equipment—they are also working on strange new electronic and infrared weapons that may not go into service in the field for another five or ten years.

POPULAR MECHANICS

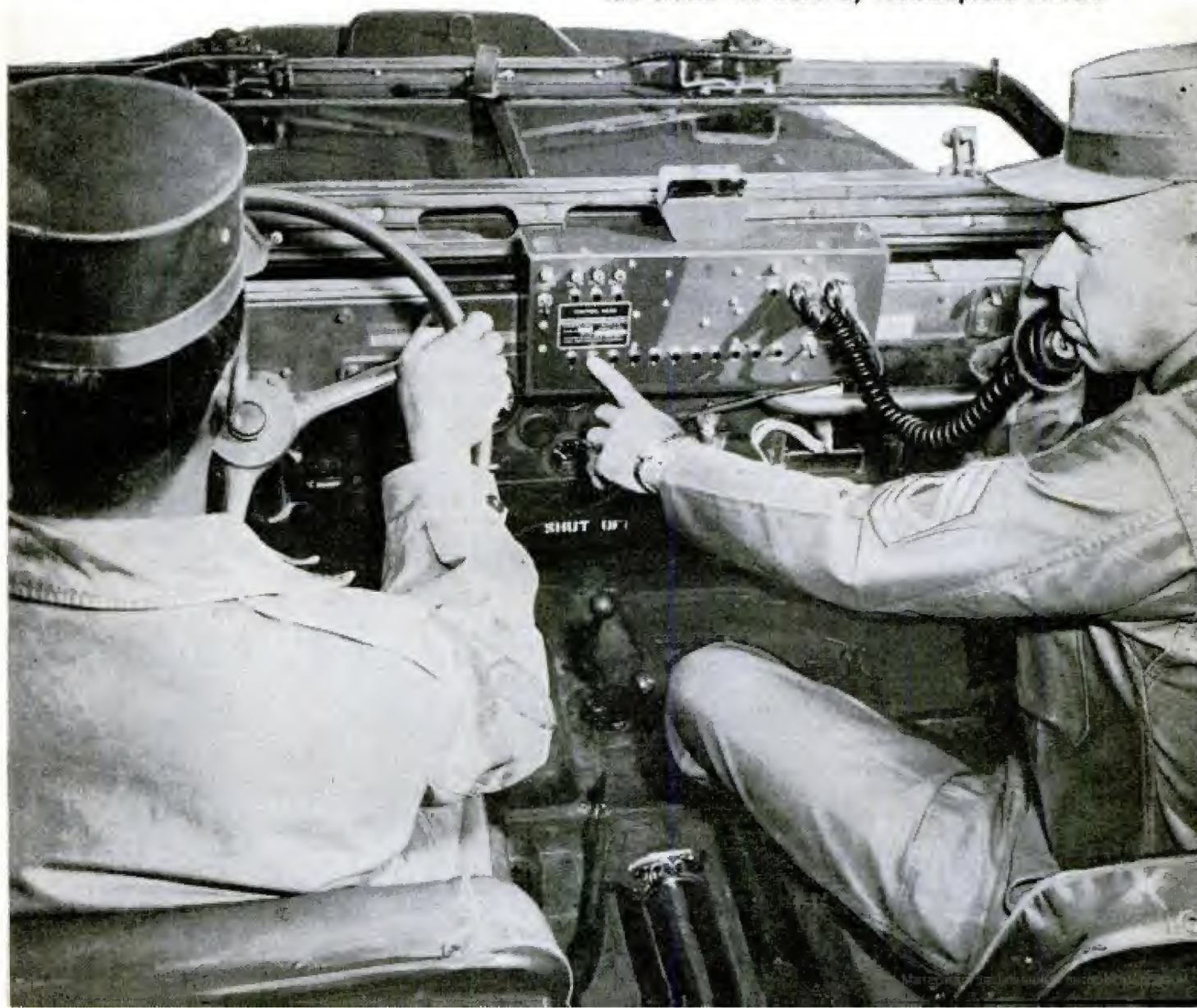
APRIL
1946

WRITTEN SO YOU CAN UNDERSTAND IT
VOL. 113 NO. 4

The ARMY'S Electronic Magic Shop

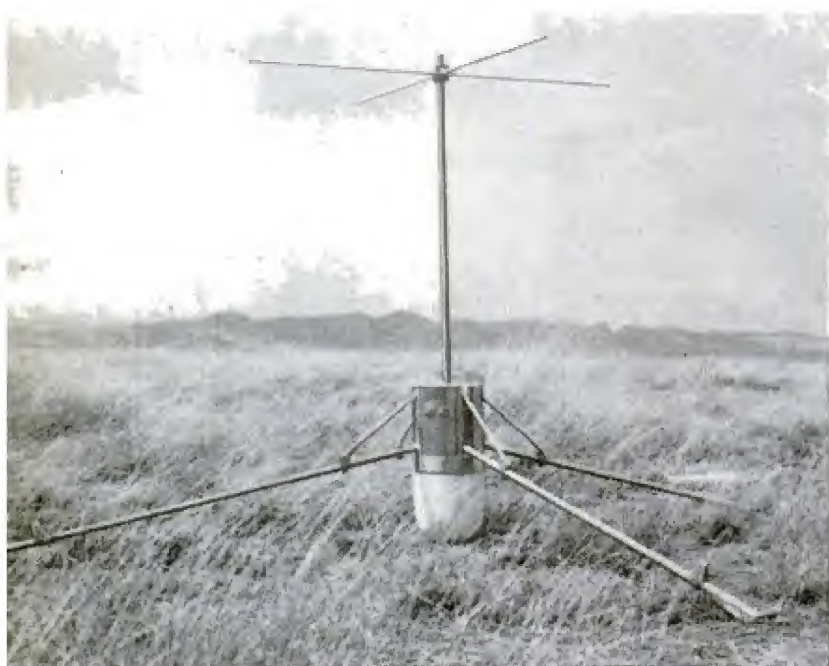
By Thomas E. Stimson, Jr.

From a jeep in the Arizona desert, this sergeant can talk around the world by radiotelephone network





Army technician readies a subsonic drone aircraft—a type now augmented by new long-range jets that fly at Mach 11



Expendable radio jammer is airdropped into enemy territory, sets itself up after landing to upset radio communications

When I visited Fort Huachuca recently I was told I'd be shown no secret devices and yet I was amazed at some of the things I was permitted to see. Not far from the crumbling ruins of the old Indian scout quarters I watched a new kind of radio station being erected. Technically it's called "mobile multichannel tropospheric scatter." A crew pulled a pair of large rubber bags from inside a couple of trucks, then minutes later the bags were installed on top of pedestals and were being inflated into shape.

"These 15-foot rubber dishes are our antennas," a tech sergeant explained. "The rear surface of each bag is metalized and serves as a parabolic reflector. The inflated bags take the place of the huge antennas the size of outdoor movie screens that are used in the troposcatter network in Alaska.

"We can erect our antennas in a matter of minutes and then we're in business. We beam high-frequency energy into the sky in the direction we want, and some of the energy scatters downward from the troposphere. We don't bother about line-of-sight communication—we can park the trucks in one valley and reach into other valleys as far as 150 miles away. We don't need relay points and it's almost impossible to jam us with any equipment."

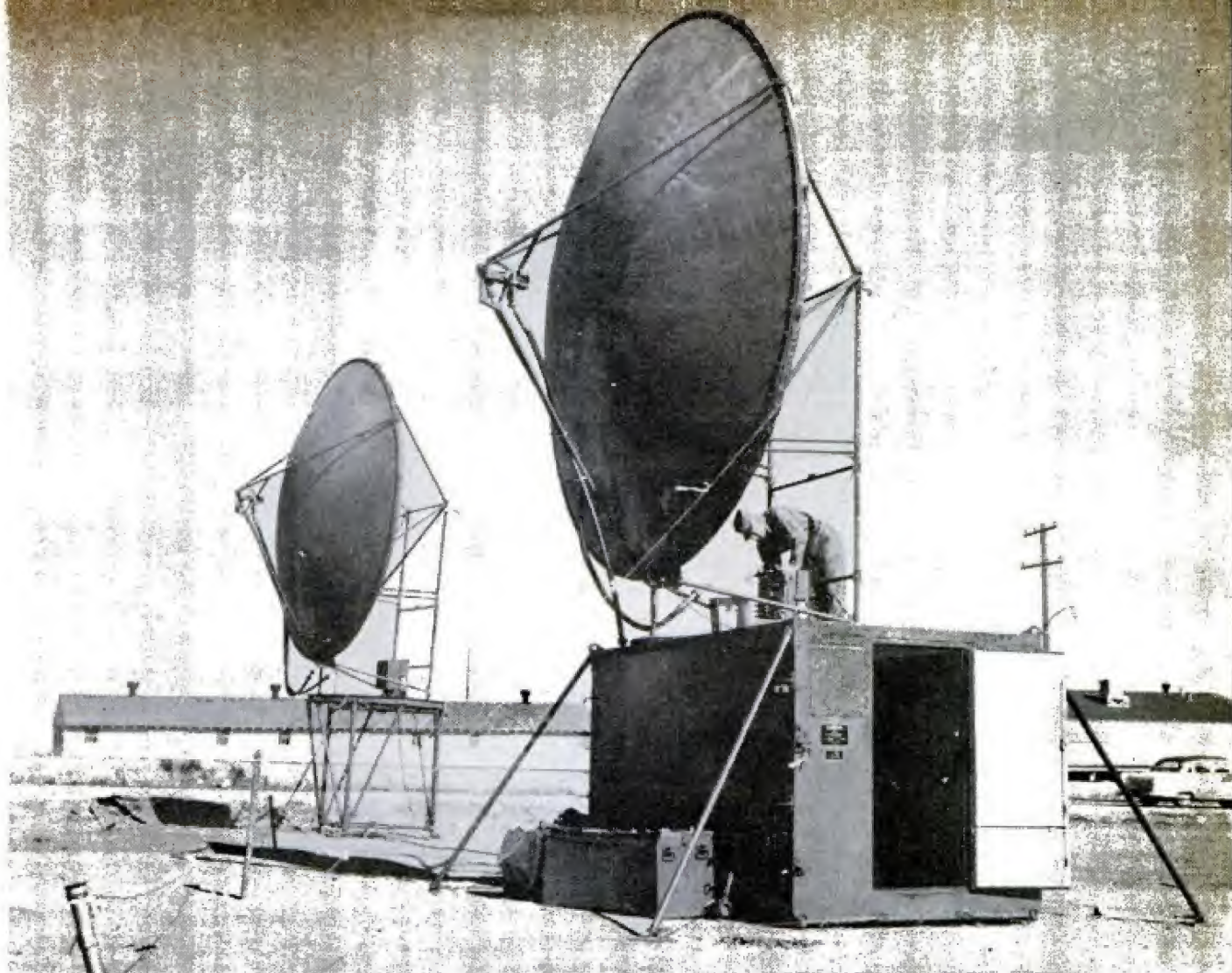
Down in the basement of Greely Hall, the post's new fortresslike command headquarters, I watched a technician operate a computer that can tell amazing things to a battlefield commander. The commander feeds into the machine all the information about his own

1. Miniaturized "flying platform" radar scanner will be so small it can be carried and hand-launched by one man

2. Planned automatic long-distance switchboard will provide 200 lines, electronically switched in microseconds, but will fit in a 2½-ton truck and needs only one operator. A conventional dial system of comparable capacity would require a building many times the size of the truck. Insert—portable handset for use with the truck's system

3. Television drones will cover tomorrow's battlefields, providing the field commander with instantaneous reports on conditions in the battle area. USAEPG artists showed this one the size of the proverbial breadbox





Air-inflated rubber antenna uses the metalized inner rear surface as a parabolic reflector for tropospheric scatter radio communication. It can be unpacked, inflated and set up in the field in a few minutes

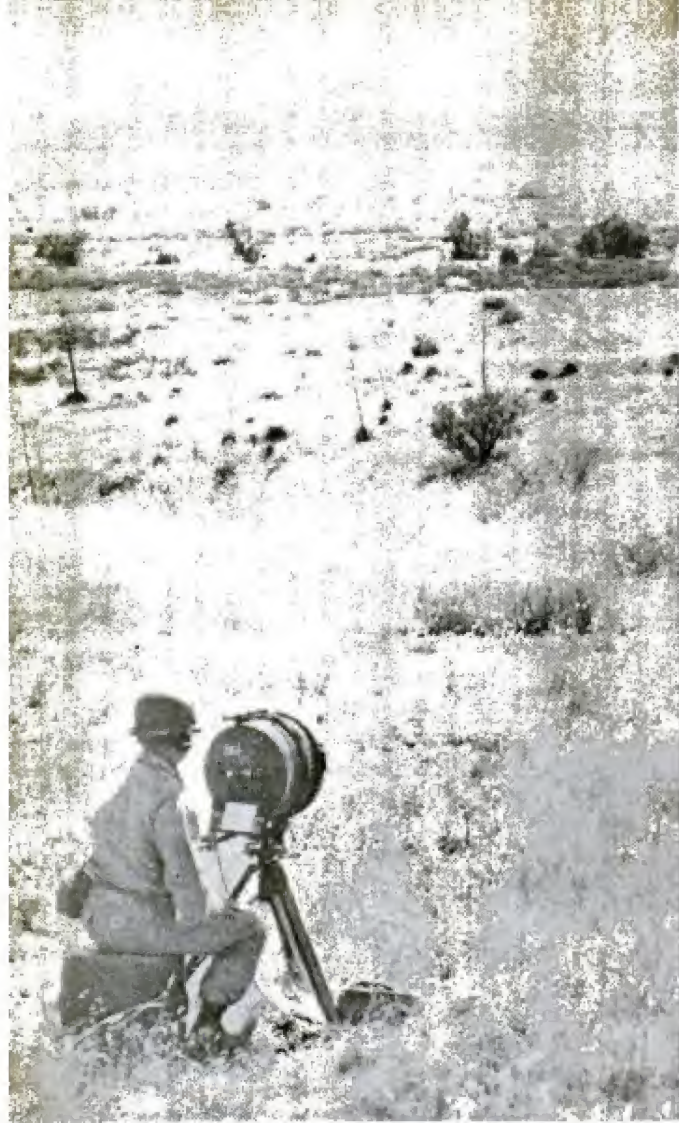
forces and all the known information about an enemy, plus other data including terrain and weather. The computer analyzes this information and tells the commander the possible courses of action that he might take, and gives the probable results of each. One thing was emphasized to me. The decision and responsibility for what he does are still the commander's. The machine gives no orders.

At nearby Libby Field I watched a plane

take off with a long boxlike structure suspended below its fuselage. This was SLAR, the Army's "side-looking airborne radar" that allows a pilot to fly in safety on our side of the lines and observe deep into enemy territory. SLAR can see farther than a human observer and through darkness and clouds. It spots anything that moves, from a squad of men to a vehicle or moving train.

SLAR is one member of a new radar





Backpacked "silent sentry" can spot a moving man a mile away in the dark or in any weather



Huachuca's original concern—Geronimo (right) and friends

family that pinpoints moving objects. In its simplest form this kind of equipment produces an audible or visible signal when it detects a moving object, and shows the distance to the object and its direction on a pair of meter dials. The smallest of these radars can be carried by two men and is called the "silent sentry." It can stand guard 24 hours a day and reports a moving man a mile away.

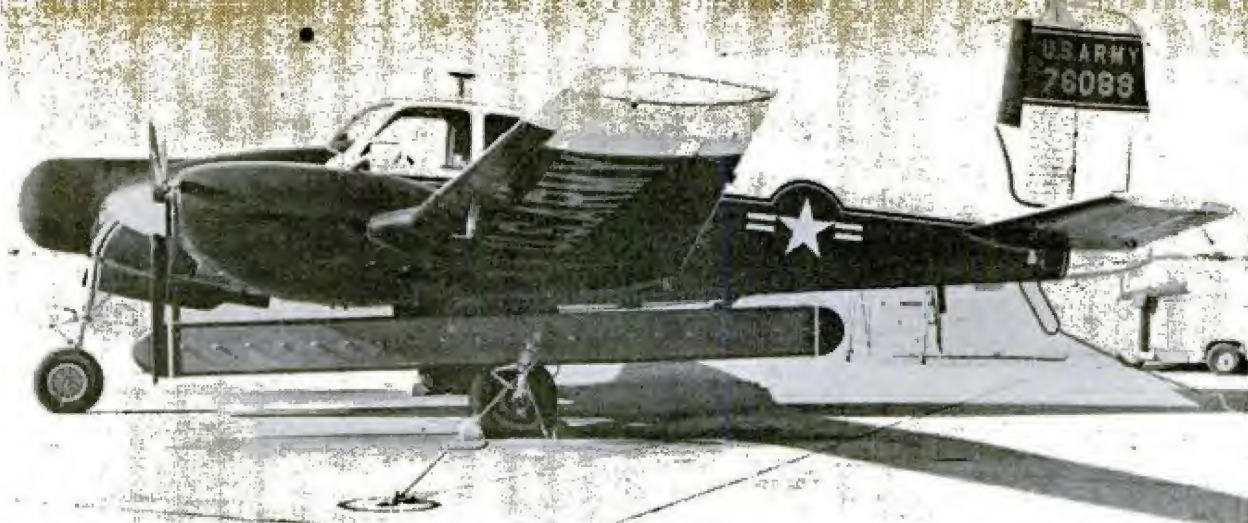
One of the most close-mouthed organizations at the Proving Ground is the Electronic Warfare Department. Its chief, Col. Walter E. Lotz, Jr., wouldn't go into details about his department's job, which has the responsibility of testing countermeasures against the fuze systems of artillery shells and rockets, and countermeasures against infrared and electronic devices.

"Colonel," I said, "I've heard a rumor that we can detonate an enemy's rocket or artillery shell while it is still far from its target, and that we have a way of preventing an enemy from exploding one of our own proximity-fuzed weapons. How about it?" Colonel Lotz wouldn't answer but I think I saw a twinkle in his eye.

This spring the Proving Ground is putting a new installation into use, an "electromagnetic environmental area." The area is 60 miles long and 60 miles wide, centered on Gila Bend. Inside the area the entire electronic array of an Army corps in the field can be simulated, including all its navigational aids, field TV, ground and airborne radar, radio and radar jammers and all sorts of communication circuits.

Jeep-and-trailer station gets maximum range from folding antenna





SLAR, side-looking airborne radar, flies outside enemy territory but spots moving objects miles inside lines

A modern corps carries more than 20,000 electronic emitters and in addition there are the communication and electronic devices of adjacent units, the Air Force and Navy, and the enemy. The whole electromagnetic spectrum is badly overcrowded.

No one knows what would happen if even a good percentage of a corp's emitters should be operated at the same time. But it doesn't take an expert to guess. Cross modulation, harmonics and spurious radiations would occur. Communication would become an unintelligible Babel. Our own proximity-fuzed shells might explode over our own troops. Our rockets might fly in the wrong direction and explode among friendly forces. By upsetting the standard radio aids to navigation the electronic mishmash might cause our pilots to fly into mountainsides after dark.

To avoid such possibilities the Proving

Ground is operating individual pieces of equipment against a simulated electromagnetic background in the new area. The idea is to learn whether the background interferes with the device and whether the device in turn interferes with other equipment. The goal is to make all the systems operate in harmony. Otherwise it may be necessary to establish frequency priorities, allowing some devices to operate only when others are shut down.

The Proving Ground is also setting up a corridor 50 miles wide and extending from Fort Huachuca to Yuma on the California border 250 miles away. Here the Army's new supersonic surveillance drone aircraft are to be tested.

"Are you interested in drones?" I was asked by Lloyd E. Snapp of Combat Surveillance and Avionics. I told him I'd seen plenty of small pilotless aircraft—I

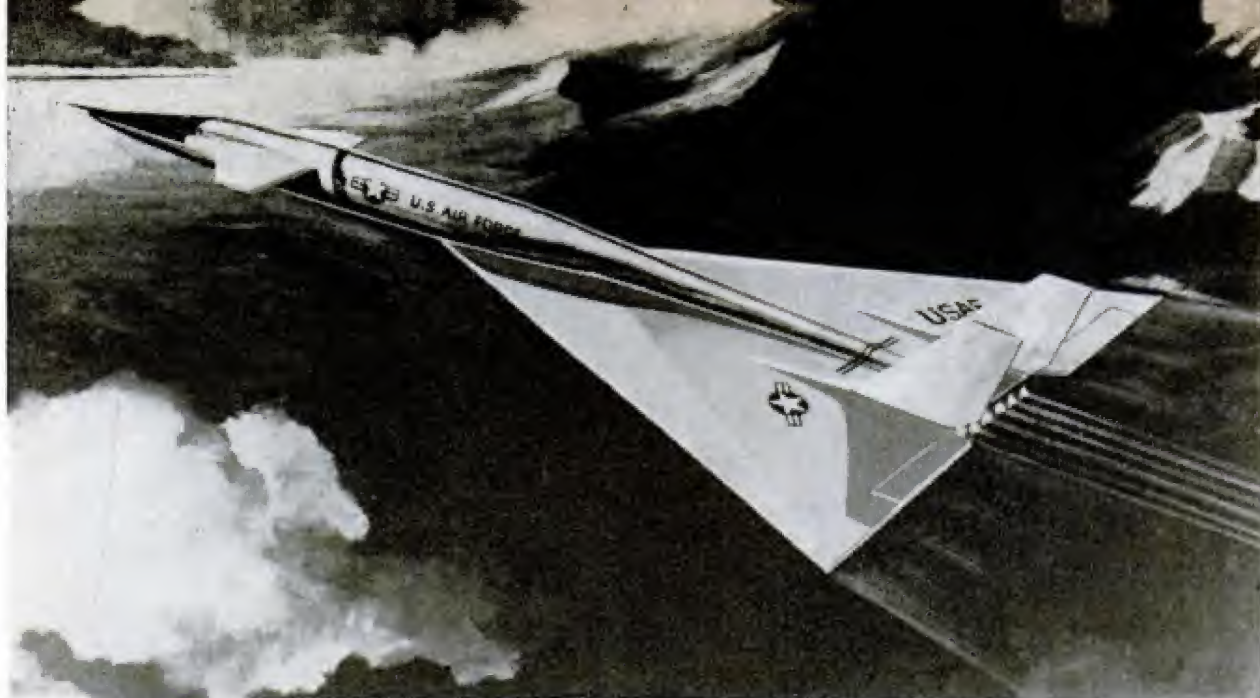
(Continued to page 280)

Medium-range field radar set detects moving objects, then tells its operator their distance and direction



Temperature gradient tower tells micrometeorologists variations in temperature just above ground level





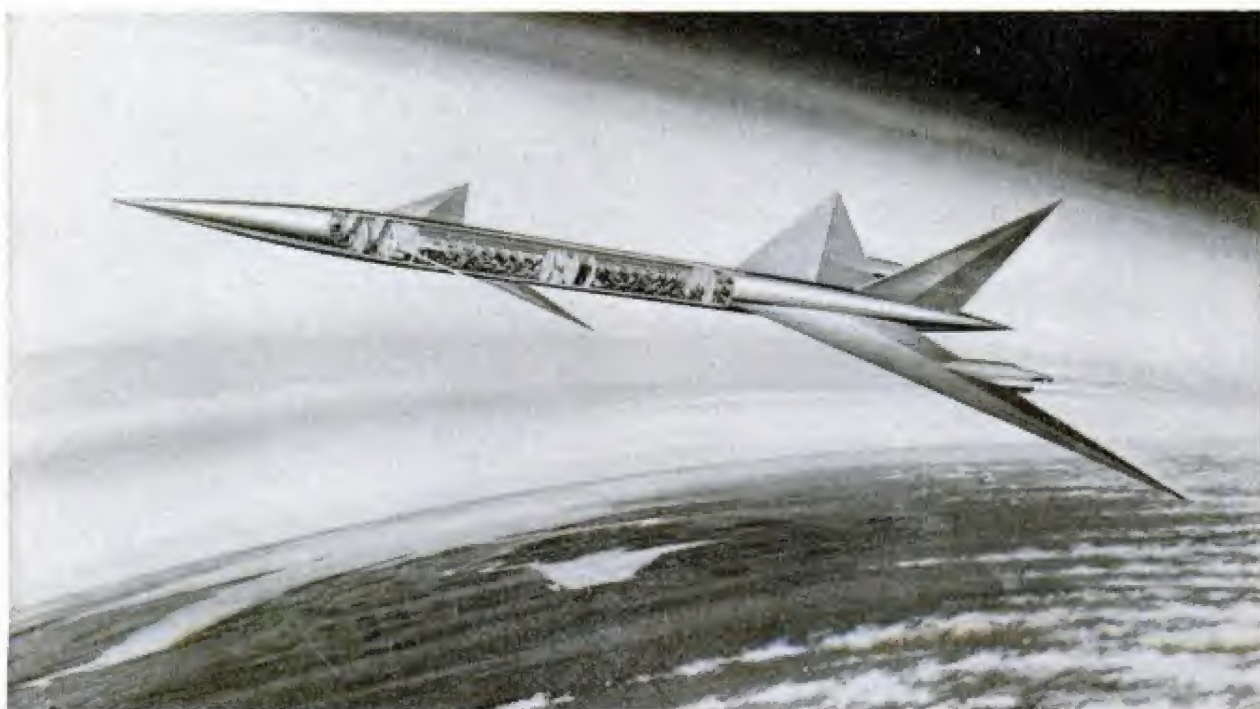
Here's a Peek at Tomorrow's Huge Planes

TWO aircraft companies are taking first steps to introduce faster-than-sound, large-sized commercial and military airplanes within the coming decade. North American Aviation, Inc., is building a prototype of the B-70 intercontinental bomber (above). Lockheed Aircraft Corp. is advocating a 2000-mile-per-hour transport adaptable for use as a military tanker, and has suggested a possible design (below) as well as an estimate of production costs.

The B-70 will feature a supersonic survival seat for each of the four crew members. Constructed like a capsule, it is sealed so there is no need for the men to wear oxygen masks or pressurized flying suits. In an emergency, at near-vacuum heights above 70,000 feet, for example, the

seat will rocket from the plane and be lowered by a 34-foot parachute. It will function as a boat should it land in water, and will carry 45 pounds of survival gear, giving protection against cold and heat.

Lockheed officials, arguing there is now no technical, operational or economic reason why a supersonic transport could not be developed in the U. S., suggest that its shape could be needle-pointed fore and aft, and that it have a swept-back stabilizer near the front of the fuselage. Passengers would sit forward of the delta wing. Such a 250,000-pound steel airliner would cost some \$160,000,000 to develop, according to Vice-President Burt C. Monesmith. He estimates that in quantities of 200 the planes could be built for \$9,240,000 each.



AN EYE ON SPACE



By Dr. Dan Q. Posin

PROFESSOR OF PHYSICS, DE PAUL UNIVERSITY
SCIENTIFIC CONSULTANT AND ADVISOR, COLUMBIA BROADCASTING SYSTEM

EARTHLINGS ARE PREPARING many kinds of fuels to propel themselves out of this world.

1. **Gasoline** is inexpensive, and its flow is easy to control. It is, however, hard to store and manipulate. It is not too reliable, as the rocket using it has to be intricate and there are many chances for breakdown. Thrust is moderate to low, amounting to about 270 pounds from one pound of fuel burning per second. Kerosene's kick also is fairly low.

2. **Exotic fuels.** Some are common substances difficult to use. Hydrogen could be a powerful fuel if burned, but it is hard to maintain in liquid form. One might liquefy hydrogen by allowing it to combine with an element such as boron, which has a high heat of combustion (25,000 B.T.U.s). So a good exotic fuel is diborane (B_2H_6), its heat of combustion being 31,000 B.T.U.s per pound. But boron hydrides are poisonous and may explode.

3. **Solid fuels** are handy, since they can be built into the rocket. Fuel material could be something as simple as rubber burning with the oxygen of some solid compound. But solid-fuel rockets tend to burn unevenly.

4. **Nuclear fission engines** are under development and, of course, they give high thrust and last a long time. But their radioactive exhaust would contaminate the launching site. The engine may be used after takeoff with safer fuel.

5. **Nuclear fusion** is something for the future, since controlled fusion has not yet been achieved.

6. **Atomic bursts**—small atomic blasts will some day be used to propel rockets or spaceships.

7. **The ion rocket** is one in which charged particles such as cesium ions are accelerated by an electric field and hurled out the nozzle. A cesium atom can easily be made to lose an electron (i.e., become ionized), and then the electric field can act on it. A thrust of more than 20,000 pounds can be obtained for every pound of cesium used up each second, but it is not easy to ionize pounds and pounds of cesium.

8. **The plasma-jet rocket** operates like this: Some fuel mixture is injected as a vapor, and an electric spark ignites it. The combustion heats up the constituents, and the expanding gases go sizzling out the nozzle.

9. **Solar propulsion** is of several types. Concave mirrors (or other devices) could absorb sunlight and produce heat to heat some gas, thereby driving it out of the engine. Or, solar heat may spin a turbine which produces electricity to expel ions. Or, sunlight may be used as mere pressure. In regions of vacuum far from restraining gravitational fields, acceleration due to sunlight pressure on a large surface eventually gives the spaceship an enormous velocity.

10. **Other energy from space**, such as plasma or ion energy belts like the Van Allen belts around Earth, may be used in the future. By ingenious navigation from one belt to another, it may be possible to "sail" almost forever on this fuel just waiting to be tapped.

Some of these may be plucked out of the so-called emptiness of space, for use in helping Earthlings on their way to the stars.



Jackie Gleason's Round House

Built of circular units connected by sweeping curved stairways, the "Studio," as Gleason calls it, sits lightly on its hilltop for all its bulk. Window walls open the view to the woods on all sides

Circular studio room is equipped with connections for broadcasting and recording equipment. Gleason plans to originate some TV programs from the house



Massive triple fireplace in the living room faces three living zones. It is built into a marble chimney that is 40 feet tall and weighs 240 tons





In the living room, all the furnishings, even to rounded rugs and accessories, carry out the circular design theme. Walls radiate inward from the perimeter and open in the center to connect the rooms without doors

THE MANY TALENTS and accomplishments of Jackie Gleason would put him out of the ordinary class of home builders. And Round Rock Hill, his new home on the outskirts of Peekskill, N. Y., is just that—out of the ordinary. Built on top of a hill in the center of nine acres of dense woodland, the house provides the comedian-composer-actor with “a pattern for living and working” — it contains his office and a broadcasting studio as well as his home.

Everything about the home is round. There's an eight-foot round bed with a built-in television set in the ceiling above it; a round shower room in glass and tile; round and semicircular rugs and furniture. Even the stairways curve to match the curve of the outside walls. In the center of the round living room is a huge triple fireplace. The studio room focuses on a grand piano.

The house is built on three levels across the 175-foot front elevation. Glass walls everywhere look out over the wooded hills. ★ ★ ★

Even the storage building on the grounds is round, almost top-shaped. The only other building visible from the main house is the eight-room stone guest house not seen here





Greenland's east coast during the "calving" season. This is at Cape Brewster, on the 70th parallel

Policing Iceberg Alley

By John C. Devlin

U.S. Coast Guard Photos

THE U. S. COAST GUARD Cutter *Androscoggin*, assigned to the International Ice Patrol, rolled and pitched in the foggy seas on the Grand Banks off Newfoundland. In the dark wheelhouse there was only the sound of the cold, wet wind humming and moaning in the rigging. Then over the intercom system came a brisk voice: "Surface contact by radar. Bearing 100 degrees. Range 38,000 yards."

The officer of the deck stepped quickly into the small Combat Information Center jammed with electronic devices and a big plotting table. "How's it look?" he asked.

The man crouched over the radarscope peered down on the dark face of the round televisionlike tube where a pencil-thin beam of white light fanned back and forth over the target area. With each scan it

brought a pulsing greenish-white blip at the same spot on the tube. "I think it's an iceberg, sir," the radar operator said.

At 20 minutes past four in the morning, the *Androscoggin* had groped its way to within a mile of the contact and hove to. Shortly after dawn, through thinning fog, the somber, ugly-looming mass of the huge iceberg became visible. One of its pinacles rose 180 feet above the sea, roughly equivalent to a 15-story building. It was 300 feet across, the length of a football field. And it was grounded on the comparatively shallow Grand Banks where the ocean is 60 fathoms, or 360 feet, deep. The berg's weight was estimated at one million tons—almost as heavy as 15 *Queen Marys*. The cutter immediately issued a radio warning to all ships.



Coast Guard Cutter *Androscoggin* tracks an iceberg off Newfoundland, dangerously near shipping tracks

This massive booby trap lying in wait for the unwary was one of approximately 16,000 icebergs "calved," as seamen say, each year, mostly on the eastern and north-western shores of Greenland, by glaciers of unmelting snows that fell as long as 50,000 years ago. An iceberg may be as small as an average house or as large as a city block; and on rare occasions in the upper North Atlantic some have been reported to be a fifth of a mile long or longer. In spite of the help of radar, mariners who sail the North Atlantic route between America and Europe—the world's most congested seaway — call this great white silent ghost-fleet the worst menace they have to face in thick of fog, storm or night.

The best ally of mariners and steamship passengers against this deadly enemy is the International Ice Observation and Ice Patrol Service. For the Patrol, playing a deadly game of hide-and-seek with icebergs, warns transatlantic vessels of the position of these great mountains of ice in the shipping lanes.

Icebergs calve in warm weather, and the danger season extends from March to July and sometimes through August. Ice Patrol aerial reconnaissance begins in January or

Same iceberg seen from *Androscoggin* lifeboat. Its size was estimated at 500 feet long, 200 high, 400 under water



February, depending on reports from ships and aircraft that icebergs have been seen approaching the critical area of the North-Atlantic.

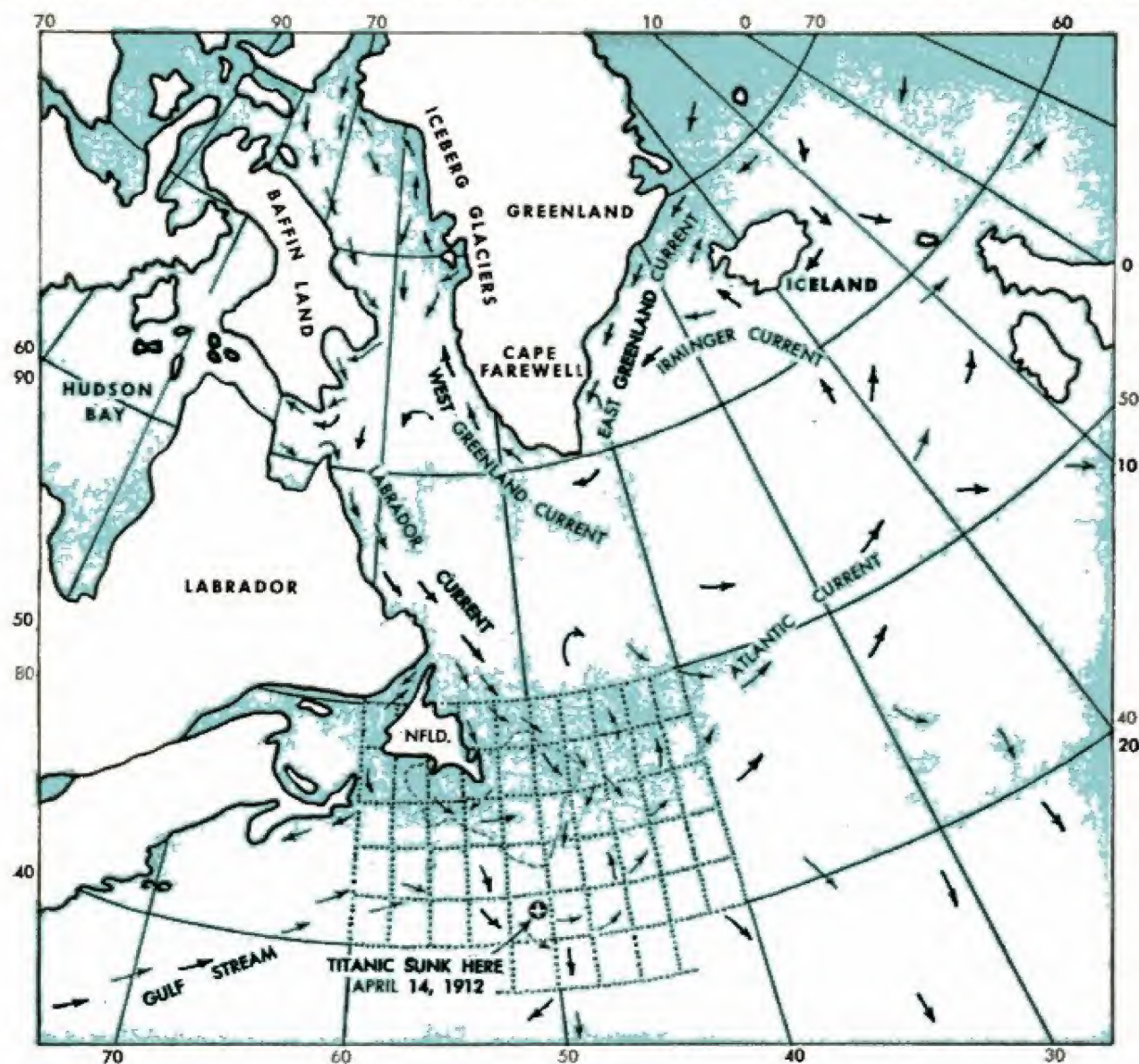
At Ice Patrol headquarters in Argentina, a windswept outpost 90 miles from St. John's, Newfoundland, each berg's position is marked on a big wall chart as the report comes in by radio from air and sea patrols. This shows the officer how many bergs are near the shipping lanes. Every four hours ships in the ice area report their position, speed, ice conditions, air and water temperatures, visibility, wind direction and velocity. From the "ice-house," as Argentina headquarters is called, an ice bulletin is broadcast twice each day by Morse code to all ships at sea.

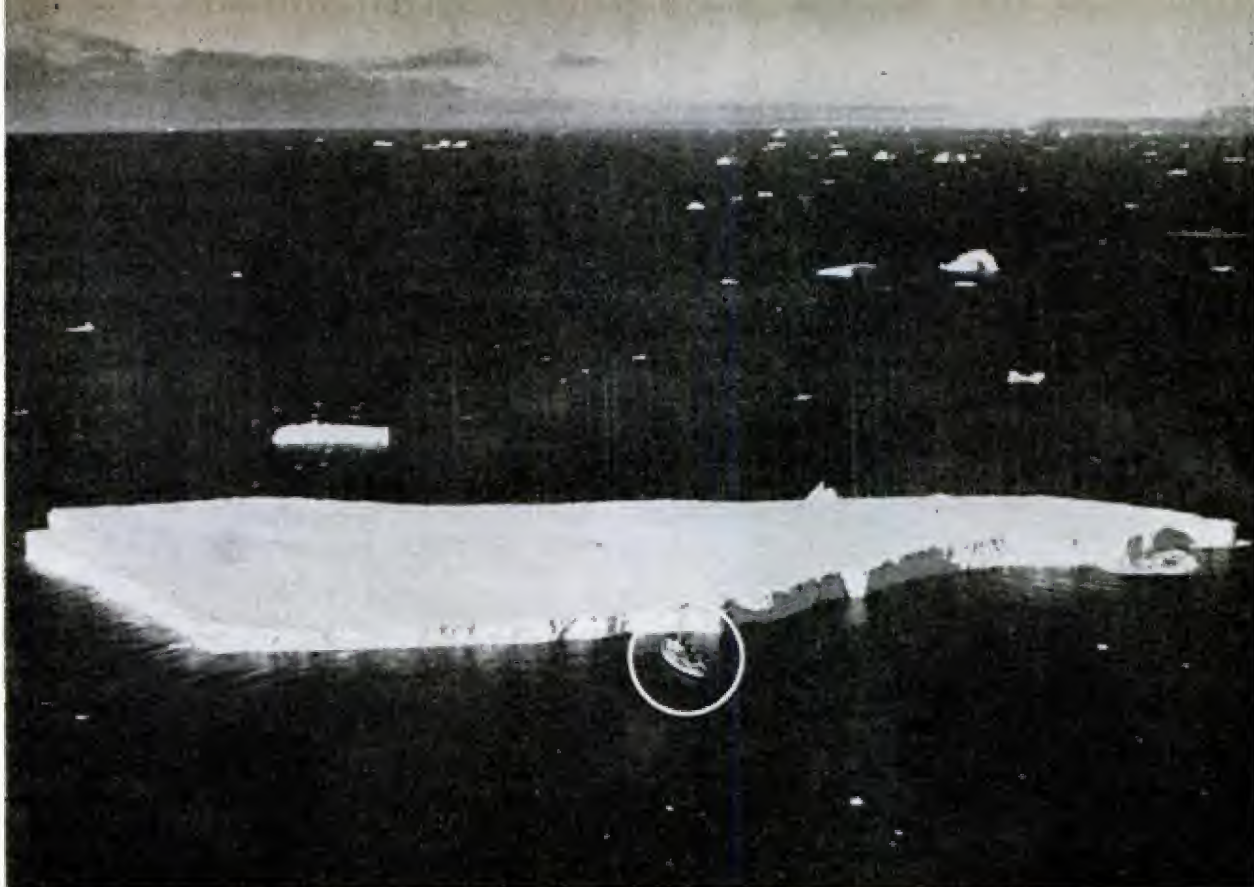
The Patrol was founded after the White Star liner *Titanic* collided with an iceberg and sank on the night of April 14, 1912, taking with her 1502 of the 2224 persons who had boarded her in England for her maiden voyage. She was the world's big-

gest and newest—an "unsinkable" ship. Her loss was a nightmarish disaster that shocked the world. In November, 1913, an International Conference on the Safety of Life at Sea met in London and provided for countries using the hazardous area to support an international ice observation and patrol service. The United States was asked to undertake its management, and the convention went into effect on July 1, 1915. The second International Conference on Safety of Life at Sea was convened in London April 16, 1929, the third in 1948, and the fourth will be convened this year, also in London.

The cost of the patrol—ranging between \$300,000 and \$500,000 a year—is borne on a "pay-as-you-benefit" basis, according to the amount of shipping tonnage each participating country has passing through the area patrolled. These countries include Belgium, Canada, Denmark, France, Italy, Greece, The Netherlands, Norway, Sweden, the United Kingdom and Northern Ire-

Chart shows iceberg drift areas and responsible currents. Dotted grid indicates area dangerous to shipping





Androscoaggin (circle) is dwarfed by a big "table-top" iceberg, very unusual in the North Atlantic area

land, and the United States. Negotiations were conducted in 1958-59 for the inclusion of Spain, West Germany, Liberia and Panama. The U.S.S.R., which had joined in 1929, dropped out in 1948.

It is the proud boast of the Ice Patrol that since the service began, no lives have been lost in the Pennsylvania-size area it patrols. During World War II several lives were lost when several ships in a convoy collided with a berg. But the war had caused discontinuation of the patrol service.

The latest ship sunk after a collision with an iceberg was the Danish vessel *Hans Hedtoft*, brand new and especially designed to cope with the thick icefields at Greenland. Like the *Titanic*, she was supposed to be "unsinkable," yet she struck a berg off the southern tip of Greenland last January and was lost with all hands. She was in local coastal waters, however, *not* in the area covered by the International Ice Patrol, which devotes itself only to transatlantic steamship lanes.

Icebergs are awesome whether you come across them in sunshine, fog, a driving gale laced with blinding snow or, incredibly, glittering in moonlight like some fairylike ice castle. Generally the

Planes take off to bomb iceberg. Below, aerial radar operator





Experimental incendiary "bomblet" burns a pocket into an iceberg. Bombs apparently have little effect on bergs

North Atlantic bergs have a pronounced opaque whiteness—with thick "cracks" which are actually lines of green or blue where the berg has frozen-in plankton or streaks of brown dirt picked up as the original glacier scraped over bare earth. The surface may look like polished marble or fused glass, or it may be honeycombed. They resemble a luminous white monster if the sun is shining—otherwise a dark and somber mass.

Sometimes, while still unseen, a berg's presence will be heralded by "brash," slushy bits of junk ice up to the size of a piano, that have broken away. The berg itself may be shaped like a big ice cake, with a flat top and sheer clifflike sides; or, if weathered, it may be irregular in shape—pinnacled or steepled, U-shaped, arched or tunneled. Dome-shaped bergs are a particular curse because their rounded noggins send a ship's radar signals bouncing off erratically in all directions instead

of straight back in a clear, sharp reflection.

On rare occasions a polar bear will be found riding along on a flat-surface berg as if he were its captain. There are almost always flocks of sea birds perched on the icy crags. There was a theory for a time that seamen might be able to detect icebergs by the seabirds serving as harbingers. Still another theory was that the presence of an iceberg could be detected by blowing a ship's whistle and listening for an echo. None of these theories, however, have proven reliable. Even with the wonders of our nuclear age, the Coast Guard says the "only sure sign of an iceberg is to see it."

Icebergs are calved by breaking off from glaciers in one of two fashions. The sheer weight of the glaciers, always increasing, forces them downward out of Greenland's mountains and into the sea, sometimes at speeds up to 70 feet a day. When the shore

(Continued to page 232)



Two Greenland glaciers join on their slow path to the North Atlantic. At the edge of the water they will give birth to big bergs

TALK ABOUT rigged TV shows! What about the so-called stock-car events at Daytona Beach? The results weren't rigged, but the conditions and the machines were.

The results have backfired somewhat. So high were the speeds, so great was the economy that the companies hesitate to quote results without explanations that say, in effect, these figures are unrealistic.

Who believes, for example, that truly stock family sedans can average over 150 miles per hour for miles? Or that truly stock compact cars can go over 125 miles per hour? Or that a stock six-cylinder car can average 51 miles per gallon?

The promoter claims that these Daytona cars are stock and can be bought by anybody (doctored only with special parts, usually described as for "safety" reasons).

The facts seem quite different. Valiant's power package includes non-standard carburetor, cylinder head, exhaust system, valves, camshaft, bearings, valve springs, crankcase (including an added oil cooler). When asked how much it would cost to get these parts on a Valiant, a factory spokesman said no price was available and that none would be available (because, apparently, no kits are available except for Daytona).

Take Falcon's modifications. The factory says it knows nothing about them except what it reads in the papers. Ford doesn't make them or sell them. The so-called "stock" Falcons in the races were equipped with three carburetors plus a fast cam and other changes based on a modification kit built by a North Carolina speed shop, not by Ford at all. How sticky can a stock-car race get?

Corvair's 95-horsepower pack was announced in mid-January but six weeks later no price nor any kit was available for the public.

What about the economy test? Here there was no AMA anti-racing resolution to bother and the factories were in it with both feet. They hired skilled economy drivers, factory mechanics reworked the cars, using extra-lean jets.

The event is sponsored by a gasoline company which, naturally, was anxious to get plenty of miles per gallon—that sells gas.

The winner Rambler American had overdrive (the three new compacts don't have overdrive) and used it. It has the Rambler overhead-valve six that puts out 125 horsepower, allowing a very high rear-axle ratio (a new heated intake manifold, which uses hot water from the heater hose not much different from the way it is used in the Ford Falcon, helps economy on the low end).



DETROIT LISTENING POST

By Art Railton

So it racked up an unbelievable 51 miles per gallon! And the industry wonders why the guy who buys a compact car and gets the usual 20 miles per gallon thinks he's been robbed! When you read about 51 miles per gallon, surely you have a right to expect 25 over-all!

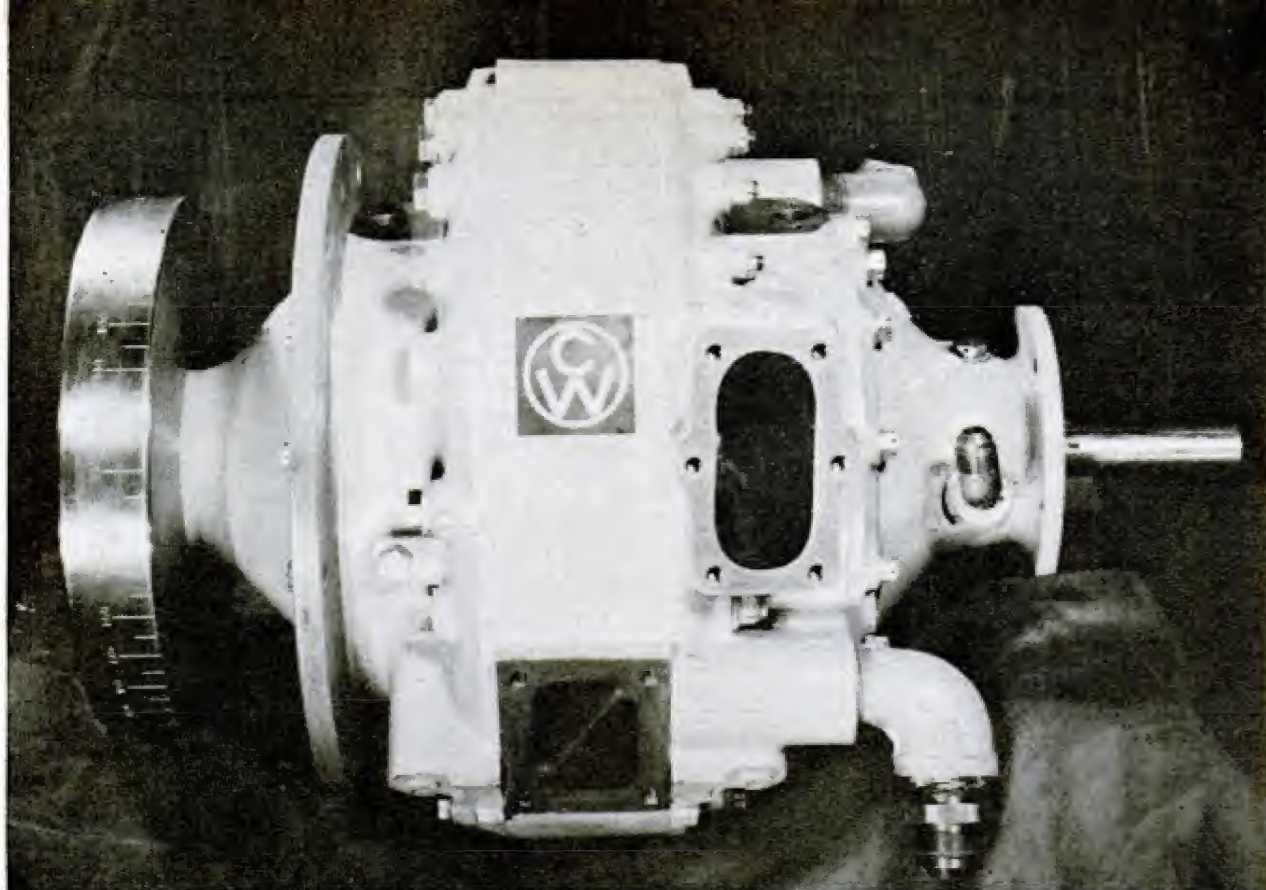
It's too early to be certain of the exact details, but it looks as though the down-the-road-a-piece Big Three entries in the really-small-car field will shape up like this: General Motors will offer a rear-engined, air-cooled car; Ford will have a front-engined, front-wheel-drive, water-cooled car; Chrysler will have a rear-engined, water-cooled car. All will be four-cylinder, short-stroke OHV engines of about 100-inch displacement. All will have full-independent suspension, under 100-inch wheelbases.

Look for something important at Lincoln this fall. It is expected to begin the big switch to a smaller, more personal car, a four-door Thunderbird concept. The switchover to the new size will take more than one model change, but the start will be made this year. In a couple of years, the big-as-a-house Lincoln will be only a memory. The days of the leviathan auto are numbered (except for funeral entourages). Even Cadillac will start getting smaller next year.

Remember the dream truck that GM had at the 1955 Motorama? It was a low-slung, front-wheel-drive buslike vehicle with its floor only a few inches off the ground. Its styling will reappear with chassis modifications (rear engine, rear-wheel drive) as the Corvair station wagon and truck line.

The BOP car will have, as you all know by this time, an aluminum V8 with cast-iron liners. It will be front mounted. More powerful, more stylish than the Corvair, it will be fast enough to run circles around all the present compacts including, rumors have it, the Valiant. All three divisions (Buick, Oldsmobile and Pontiac) will sell the car.

Goodbye, Opel and Vauxhall. It was nice having you visit! ★ ★ ★



Curtiss-Wright Corporation photos

Rotating combustion engine has only two moving parts and is compact, lightweight and free from vibration

REVOLUTIONARY ENGINE

ABOUT 30 YEARS AGO, Felix Wankel, a German industrial designer, concluded that the stop-and-start action of a stroke-piston internal-combustion engine was not the most efficient way to make wheels revolve. A far more logical method, he felt, was through a smooth, rotating action—like that of a water wheel.

As a result of experiments that Wankel carried on during the ensuing years, and

of further development in recent years by a German and an American industrial firm, that smooth, rotating source of power—the rotating combustion engine—is now close to becoming a production-line product.

The American firm, Curtiss-Wright Corporation, plans to begin producing the engine this year. NSU Werke, a motor company in West Germany with which inventor Wankel is associated, will concen-

The intake, compression, ignition, expansion and exhaust sequence in the rotating combustion engine is practically continuous because it is rotating with the rotor. As shown in Figure 1, the gasoline-air mixture enters the chamber through a port. As the rotor turns further, mixture is compressed (Figures 2 and 3)

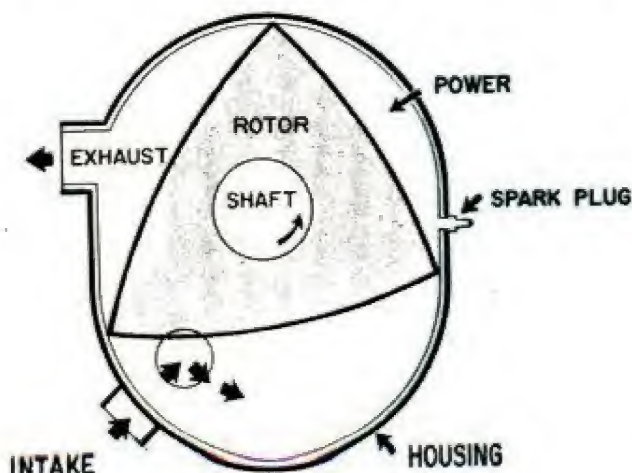


FIGURE 1

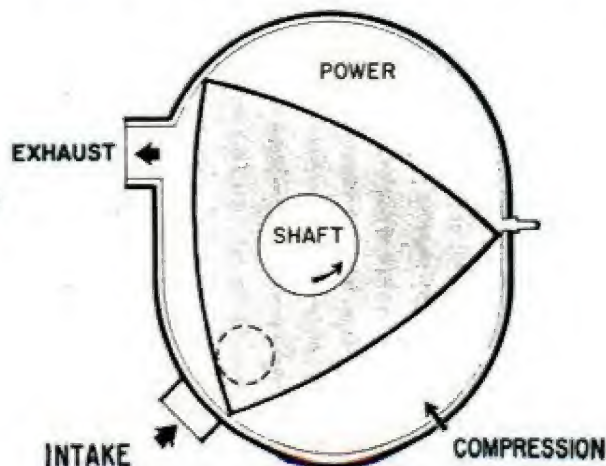
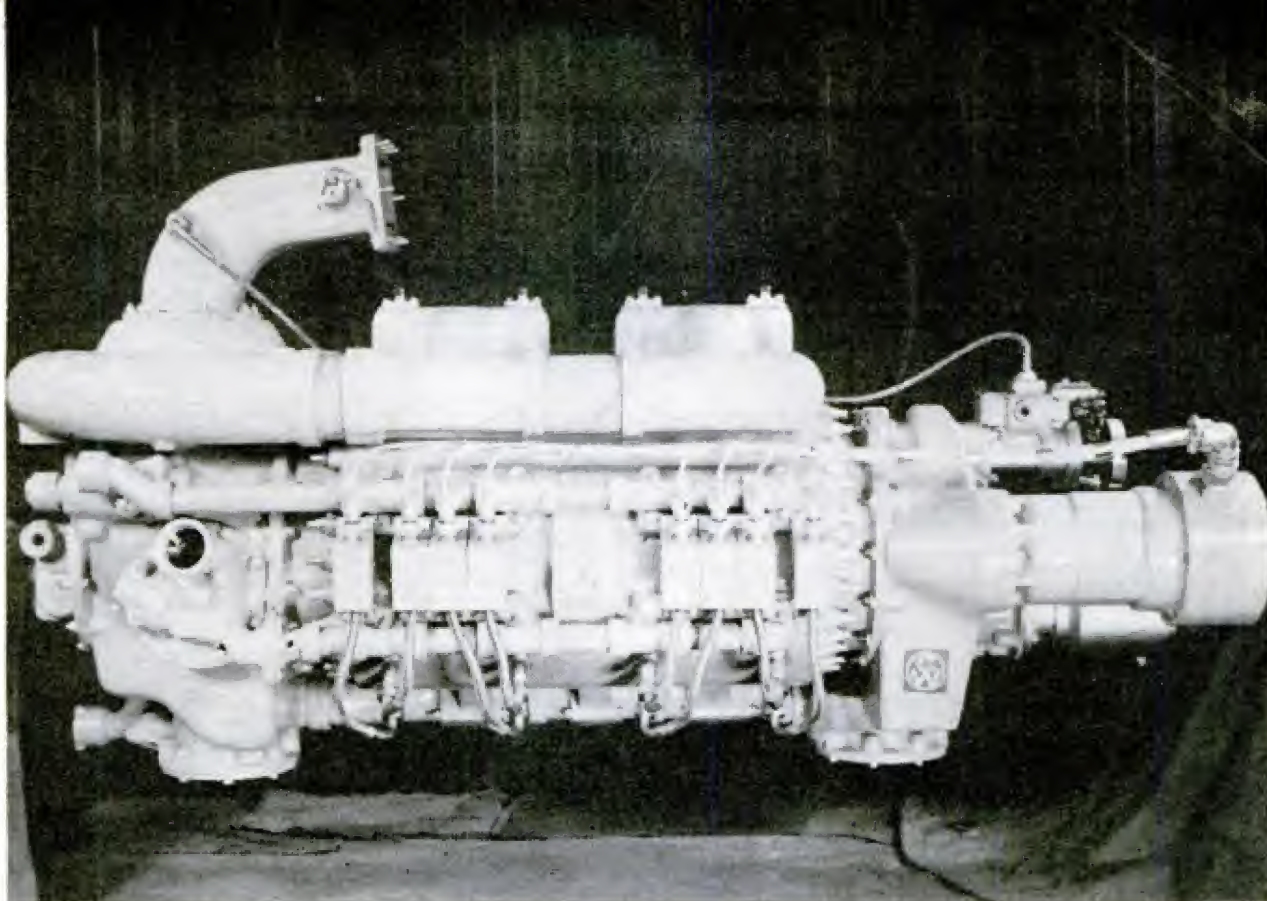


FIGURE 2



Developed for aircraft, this YRC 600 supercharged engine operates on the rotating combustion principle

trate on low-horsepower engines while Curtiss-Wright will develop those in high-horsepower classes, including types for aircraft.

Compact and lightweight, the rotating combustion engine requires no valves, springs, camshafts, pistons or connecting rods. Rather than cylinders and pistons, the engine has a single combustion chamber shaped somewhat like a jelly bean. Revolving inside the chamber is one of the engine's two moving parts, a rotor that is shaped like an equilateral triangle with its

sides bowed outward. (The other moving part is the crankshaft.)

The rotor makes an eccentric orbit inside the chamber so that its three corners are in contact with the chamber sides at all times. An inset metal strip at each corner of the rotor acts as a piston ring, sealing each of the three cavities formed between the rotor's sides and the walls of the chamber.

An automotive carburetor supplies a mixture of gasoline and air into the engine

(Continued to page 258)

The compressed mixture is fired by a spark plug (Figure 4). The expanding gases during combustion deliver the power through the rotor to the crankshaft. The chamber then exhausts through a port. Since all events occur almost simultaneously, the rotating combustion engine is smooth operating and highly efficient

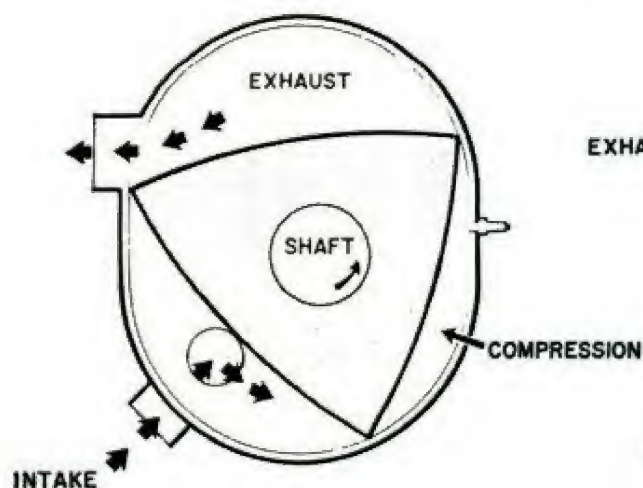


FIGURE 3

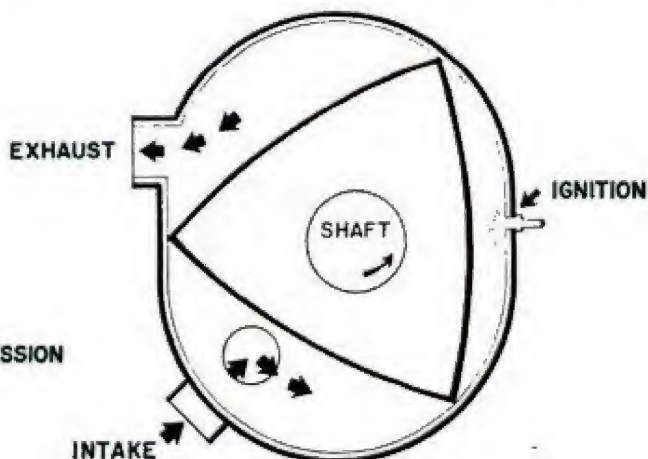


FIGURE 4

HOW GOOD IS THE FALCON?

Owners like:

Handling ease	61.3%
Gas economy	49.9%
Riding comfort	24.9%

Why did they pick Falcon?

Economy of operation	68.8%
Over-all size	48.0%
Exterior styling	41.5%

WHAT'S WRONG WITH IT?

Owners dislike:

Not enough power	18.2%
Body rattles	7.0%
Poor gas mileage	5.8%

What should be changed?

Step-down floor	4.7%
Tire size	3.4%
Increase horsepower	3.4%

WILL THE FALCON CUT INTO IMPORTED-CAR SALES?



YES say 90.6%

NO say 9.4%

Falcon has:

More room
Better service
U.S. label

Imports have:

More economy
Better quality
Lower price

FALCON OWNERS LOVE IT,

Falcon owners like the ease of making sharp turns like this, but some find fault with its grille design



OWNERS
REPORT

A NATIONWIDE SURVEY



**BASED ON 1,406,369
OWNER-DRIVEN MILES**

Well liked is Falcon's simple styling, but owners say windshield is so high driver is bothered by the glare

BUT WOULD LIKE MORE PEP

THEY LOVE IT—that's how owners feel about the Falcon. This new Ford compact racked up the best record of owner approval in the history of *PM's* Owners Reports. Less than one percent rates it Poor.

These owners are happy. They like the car. They like its simplicity. They like its economy. They like its conventionality. There's little they don't like.

What about the inevitable new-car bugs? Apparently, there are very few. This well-thought-out machine may not be exciting to the engineer, but it sure is satisfying to the owner.

PM asked 1000 Falcon owners from coast to coast about their cars. These owners have driven their cars under all kinds of weather, over all kinds of terrain, in all kinds of traffic. Result: Wholesale approval.

Here are some general comments about the car, before we get into the particulars:

"Just between me and you, people don't think you are stuck up and they are not jealous when you buy a small car even if new. That was what happened on our street. Everyone was going above their pocketbook, buying a larger car with more power, high price, high-octane gas, too much money on their car for such a small house as they lived in. The people don't need a bigger car. It's just right."—North Carolina truck driver.

MARGINAL COMMENTS BY ART RAILTON *PM's* AUTO EDITOR

*What kind of car is it?
Certainly not frisky.
You'll get no tittup here.
But it's sensible, so
much so that you feel
confident just looking at
it. Surely, you feel,
nothing could go wrong
with such a simple ma-
chine. You won't rave
about it, but neither
will you rant.*

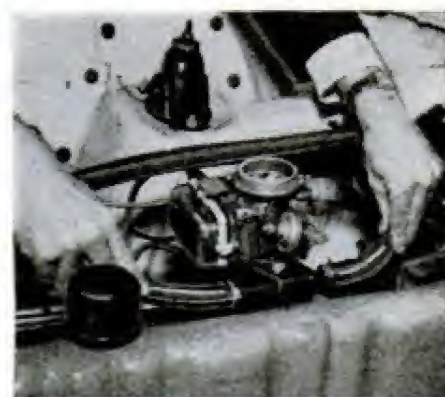
*Detroit used to shrug off
talk like this. But now,
people are putting their
money where their mouths
are—and money is the
loudest noise Detroit
hears.*



Owners like the way it drives on a winding road. Dashboard is orderly

Left, women say the stepdown floor makes it awkward getting in and out

Carburetor icing is prevented by piping hot water around intake manifold



Five years? More likely only two. Certainly no more than three. →

"This car represents the initial stage of a movement, demanded by the average family, toward more economical and practical transportation. These compact cars will dominate the automobile industry within as short a period as five years."—Maryland salesman.

"I'm tired of all the fancy trim and humps on the modern car. First-cost and upkeep are way out of reason. Now I have a car again that is satisfactory, just as easy to drive, good heater and economical."—South Dakota cafe owner.

Let's be specific about the Falcon. Most of all, the owners like its handling ease, with 61.3 percent listing it as the best-liked feature. They have discovered that small cars have more virtues than economy, that they are easier to live with, easier to navigate.

With missionaries like him out spreading the gospel, how can the small-car fail? →

"The more I drive the better I feel about buying this Falcon. I have not given up comfort because the car is small. I enjoy driving a car more now than I ever enjoyed it before. On long trips I'm not as tired as I used to be in my old car which was much larger."—Utah aircraft worker.

There's something about returning to fundamentals that is satisfying—like a good steak after your wife's been on a let's-try-some-new-recipes binge! →

"I enjoy it more than any car I've ever owned and my wife does too. Giving up power steering, brakes and an automatic transmission took a lot of doing, but we were so sick of buying gas every time we drove that we were eager to try something new. If more people would try it they would soon learn to enjoy a smaller car."—Ohio foreman.

Second on the best-liked list is gasoline economy with 49.9 percent mentioning it.



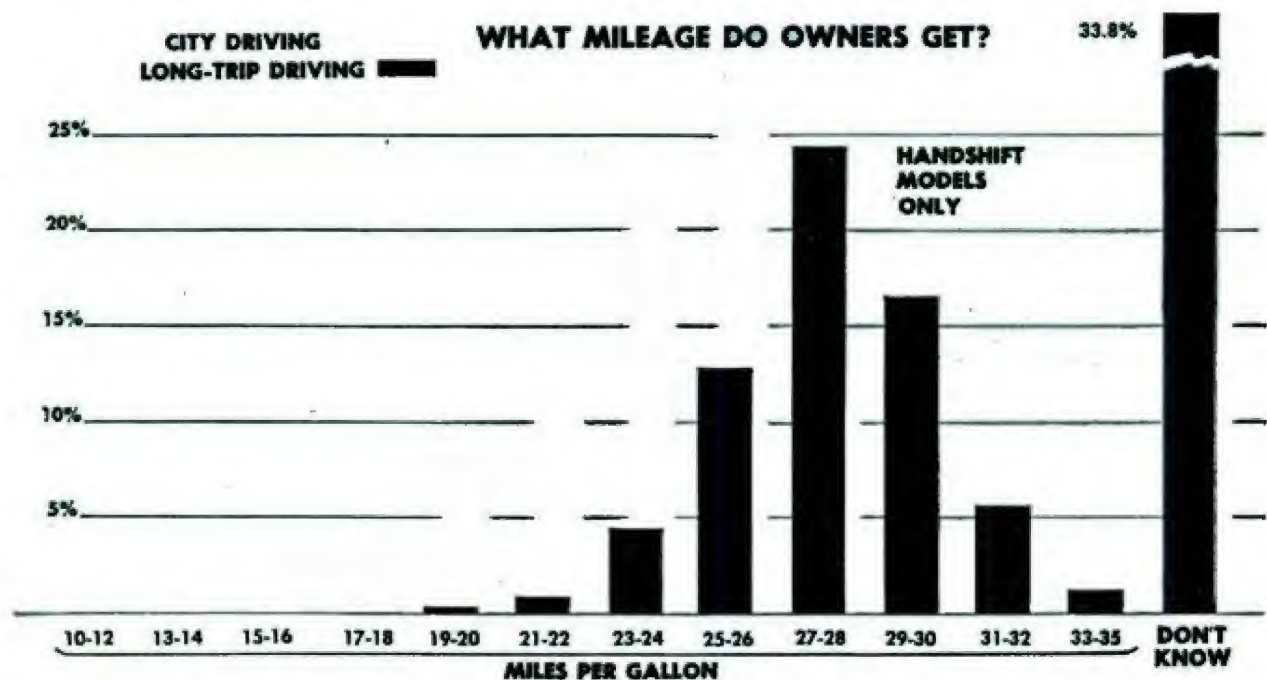
Hood is not counterbalanced. You must prop it open with this rod (arrow)

Right, the top complaint is a lack of power, especially on steep hills

Trunk is roomy. Gas tank neck (center) tends to spill gas when topped



Most Falcon drivers with handshift transmissions say they are getting between 23 and 30 miles per gallon





Neat is the rear-end styling with simple metal sculpturing. Huge back window gives excellent visibility

See page 270 for PM's
test on gas economy →

Not just an in-town car, Falcon is
well mannered on the highway



"I am a rural mail carrier with a 47.35-mile route, including 6 miles of dirt road. I average 22.9 miles per gallon. My route consists of 45 stops. I'm well pleased. I have a hand-shift transmission."—South Dakota mail carrier.

"I spend \$3 a week for gas. My 1958 Edsel cost me between \$10 and \$12 a week."—Rhode Island conservation officer.

"Under 60 miles per hour you can get 28 miles to the gallon, but if you drive 70 you will get about 22."—Nebraska farmer.

Third on the list of praiseworthy features is riding comfort with 24.9 percent mentioning it.

"We took a fast 8300-mile trip in 33 days, covering Ohio, Pennsylvania, West Virginia, Virginia, North and South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, Texas, New Mexico, Arizona, California, Nevada, Oklahoma, Missouri, Illinois, Indiana and back to Ohio. We enjoyed this long vacation because we had a very comfortable riding car."—Ohio electrician.

(Continued to page 270)

SUMMARY OF OWNERS REPORT:

FALCON





Amsterdam's Narrow House

Facing a canal in Amsterdam, The Netherlands, is a two-story house so narrow that two people have difficulty passing each other in its tiny rooms. The front door opens onto a staircase which leads directly to the living room of its occupants, a retired seaman and his wife, who've made the house their home for 21 years.



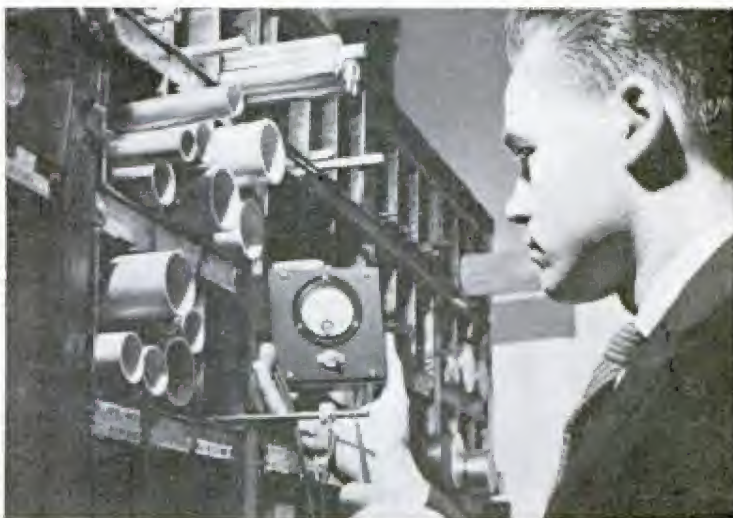
Clean Way to Clean Type

Typewriter keys now can be cleaned merely by running a letter-size sheet of special paper through the feed roller and typing on it. The paper, a soft fibrous material that looks like pink "flocked" paper, has a mild adhesive that causes dirt on the type to stick to the surface as the type face strikes the paper. It automatically cleans the feed roller, too, without depositing any liquid on the typewriter mechanism. The paper is perforated every 1½ inches so portions may be torn off.



Tester Finds Right Metals

Choosing correctly between metals that look alike but have different properties is the job of a "metal sorter" being used at the Knolls Atomic Power Laboratory in Schenectady, N.Y. Metals, such as inconel and stainless steel that are used in nuclear reactors, look alike but cannot be used interchangeably in a reactor. Metals are attached to a clamp-on lead on the tester, and a carbon-steel file is rubbed against them, generating current. Current causes a dial to indicate the type of metal tested.



Plastic "Igloo" Shelter

Old soldiers may soon mark the passing of another familiar Army institution—the olive-drab canvas tent. The Atlantic Research Corp., working with the Quartermaster Corps, has developed a plastic-foam shelter that is low in cost, lightweight and weatherproof. One man can carry a kit which will form a shelter big enough for 10 soldiers. In use, a canvas dome "form" is inflated on the site, then sprayed with a self-rising foaming plastic which hardens in an hour. The form is deflated and removed for reuse, leaving a plastic shell 6 feet high, 12 feet wide, and weighing less than 200 pounds. The foaming plastic can be mixed quickly in the field, and color additives used to make the "igloo" match its surroundings perfectly. The door is simply cut out with a bayonet.



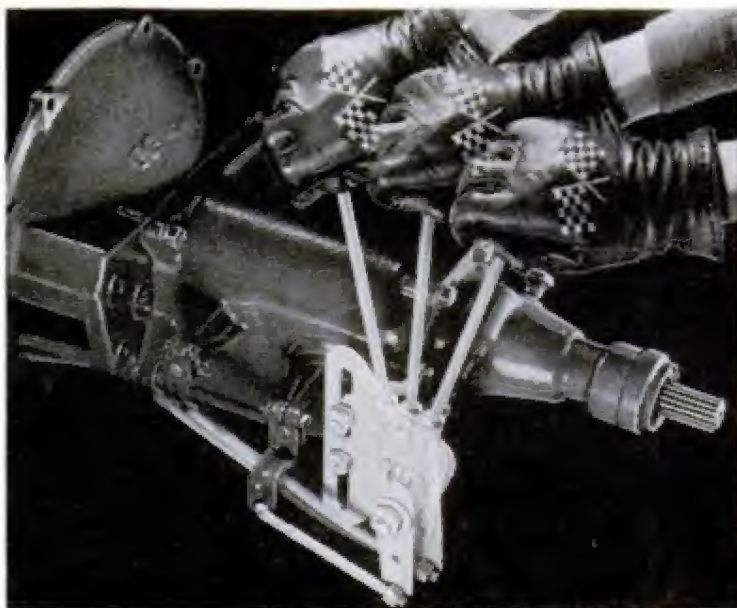
Bed for Traveling Dogs

One of the problems of traveling with a dog is providing a familiar, comfortable bed so he'll sleep well in strange places. A new traveling dog bed provides a good-sized suspended-canvas "pad" for all but the biggest breeds. The bed is 26 by 36 inches, and 6 inches high, but folds into a one-inch by eight-inch package 36 inches long which can be packed easily in the car. Made of canvas and aluminum tubing, it weighs only three pounds.



Kit Puts Shift on Floor

Chopping valuable racing seconds from stick-shift driving, a column-shift conversion unit eliminates completely the zigzag motion of conventional "H" patterns. Installed on the floors of both competition and family cars, the unit has a straight-line shift. For low, you push down and forward, for second pull straight back, for third push straight forward, and for reverse push down and pull back. It is impossible to miss a shift, according to the manufacturer. The unit converts column handshifts of all cars except Fords between 1932 and 1948.





Portable Bandwagon Hauled Like Trailer

Transported like a house trailer, an all-purpose bandwagon can be set up quickly as a music shell, a stage or a show wagon. When time comes to travel, the portable wagon folds into a trailer eight feet wide. Varying in length from 24 feet to 32 feet depending upon the model, the unit's stage consists of risers that can be left flat to form a stage eight feet deep, pulled straight out, or unfolded as steps or risers in sections four feet wide. When all steps are unfolded (photo at right), the bandwagon accommodates a band of 60 pieces. A stage 16 feet deep can be set up when the risers are pulled straight out flat.

❏ Nuclear bombs have produced radioactive carbon-14 in the earth's atmosphere 15 times faster than nature during the past four years.





Dr. Dezso Levendula hypnotizes five policemen who witnessed a staged "murder" at the Cleveland, Ohio, Law-Medicine Center. The experiment demonstrated hypnosis can help eye-witnesses recall details of a crime

Solving Crimes By Hypnosis

By George J. Barmann

*Cleveland Plain Dealer
1301 Superior Ave.
Cleveland 14, Ohio*

TWENTY YOUNG POLICEMEN were sitting in the bright, comfortable classroom of the County Coroner's Building, on the campus of Western Reserve University in Cleveland, Ohio, listening to a lecture on methods of questioning witnesses to a crime.

A psychotherapist, Dr. Dezso Levendula, was conducting the lesson in scientific law enforcement, one of the regular courses given by the university's noted Law-Medicine Center. He was speaking that morning about the difficulty of getting witnesses to recall accurately what they have seen.

Behind him, on a sofa facing the class, were two stenographers, busily taking notes on the lecture. The audience of patrolmen and several guests was attentive, but relaxed. Only the occasional hum

of an automobile outside the windows cut into the professor's talk.

At a desk near the stenographers sat Dr. Samuel R. Gerber, the county coroner. Now and then Dr. Gerber glanced around the room and scribbled on an envelope.

Suddenly, there was a commotion, and Dr. Levendula turned to see what was happening.

The stenographers were arguing and getting up from the sofa. In a second, they were grabbing at each other's hair and tussling over a handbag.

"Stay out of my purse!" the blonde shouted. "You're stealing my money!"

"No, I'm not. I'm only after your cigarette lighter," the brunette snapped. "You keep your hands off me!"

The women struggled. Something red



Two stenographers who normally took notes during lectures participated in the experiment. They unexpectedly threw down their notebooks and began quarreling over a purse. Then one woman "stabbed" the other

flashed in the hand of the dark-haired one. She swung at her opponent, who screamed, clutched her left side and doubled up on the sofa.

"Oh, my God, what have I done?" the brunette cried, and ran out of the door.

Quickly, before the stunned audience could move, Dr. Gerber rapped his desk for attention.

"All right, class," he said, "let's all take it easy. What you just saw was only an act. This was a fake murder. We staged it, we're doing an experiment. Now, if you'll sit back, we'll have something new in our lesson."

After everyone had calmed down, Dr. Gerber, who is a physician, attorney and co-director of the Law-Medicine Center, which counsels in legal, medical and police problems, told the lecturer to go on. Dr. Levendula resumed his talk where he had left off—the questioning of witnesses with the help of hypnosis.

Dr. Levendula explained that the "crime" followed a carefully rehearsed script. He wondered how many details of this "murder" the class could recall. The psychotherapist, who is president of the Cleveland Society of Clinical Hypnosis and an authority on the medical uses of hypnotism, suggested that hypnosis might sharpen their memories.

Five of the patrolmen volunteered for a unique test which may add significantly to the science of criminal investigation.

First, the policemen were asked to write down all they had seen, just as they would for any routine police report. After this, they were hypnotized by Dr. Levendula; then, upon awakening, they made their observations orally to a tape recorder. They were hypnotized a second time, and now gave oral statements while under hypnosis. Finally, they were brought out of this trance and requested to write new reports.

As the patrolmen moved along in the four-stage test, their ability to recall events improved surprisingly. Dr. Gerber and Dr. Levendula compared the two written reports so there would be no chance of a mix-up, the one before hypnosis had been written on white paper, the other, after hypnosis, on blue paper. The doctors found that the results were remarkable.

The first reports were all matter-of-fact, somewhat sketchy. But in the last reports, even some of the fine details of the classroom incident were vividly described. And, as law enforcement authorities know, those little details often break a baffling case wide open.

The violent scene—the two stenographers arguing on the couch, one rifling



After the "murder," the men recalled few details, but they gave fuller accounts after being hypnotized. While in a second trance, they were able to remember even more details

the other's purse and removing the lighter and a \$5 bill, the fight ending in the stabbing with the phony ice pick—took only ten seconds.

In the reports, the patrolmen reveal how hypnosis helped them to recall this event.

Before he was hypnotized, Patrolman Foster Lockhart wrote that the weapon "looked like a screwdriver." But after hypnosis, he remembered that the instrument

had a red handle—which was correct. He also was able to recall another important fact that he hadn't before — there was a faint scar on the blonde's upper lip. He now remembered, too, that when she collapsed, "she put her head on the arm of the sofa." That was right.

Patrolman Anthony R. Lutz, in his first try, said the crime was committed with an "unknown instrument." However, when

On awakening from the second trance, the men were asked to write detailed reports. They described, among other things, the "killer's" weapon, her hair style and toeless shoes





Dr. Levendula, standing, and Dr. Samuel R. Gerber, co-director of the Center, question one of the men while he is still in a trance. They believe that hypnosis will come to be a recognized weapon against crime

he awoke from hypnosis, he wrote: "The dark-haired girl pulled from her purse an object that looked like it was rounded on the end and circular throughout, because the cap which fits over the end of the wooden handle appeared to be round. I did not see the blade, but I caught a reflection of light, which leads me to believe that it was either highly polished, or plated. This object looked like it was about seven inches in overall length." A pretty good description.

The patrolman also said that the pencils the stenographers used were yellow and had erasers—details he had missed before. And, most important, he wrote, "This fight lasted about ten seconds." He hit the time right on the nose.

In first discussing the women, Patrolman Joseph Pokrandt gave what Coroner Gerber calls an "adequate" description. Later, the policeman listed camera-eye details—the blonde had "long hair touching the shoulders;" the brunette's hair was up-swept, "with loose ends about the region of the upper ear."

Another patrolman, Lloyd J. McKenna, Jr., was able to reproduce some of the fastest dialogue just before the stabbing occurred, almost as if he had been the author of the script. And the fifth patrolman, James Painter, in his final statement, added a footnote about the killer's shoes. He said, rightly, that they were toeless.

"The results of our work offer a strong argument for the use of hypnosis in police investigations," says Dr. Gerber, who has lectured on criminology to physicians and

Scotland Yard men, in London. "Everybody knows that one of the big problems in checking a crime, or just a simple traffic accident, is in getting full and accurate information. You get skimpy and conflicting accounts of what happened from eye-witnesses. Even from the honest and most intelligent ones.

"Many times, people would really like to recall events to help the authorities, but they can't. The power of human beings to remember precisely is, at best, rather faulty. In fact, after witnessing violent and tragic happenings, a person usually tries to forget, because it pains him to remember. Actually, the subconscious mind suppresses such pictures; it tries to bury and hide them. We all choose to recall nice, pleasant things in this world; that's why we like to think about the 'good old days.'"

Dr. Gerber believes, therefore, that hypnosis could be used to unlock many secrets for police and detectives.

Dr. Levendula, who uses hypnosis successfully in his own private medical practice, says that many persons who themselves have been victims of a crime often are poor witnesses. They are shocked psychologically, for example, by fear, excitement, horror, grief. "In such cases," he remarks, "hypnosis could be very helpful, permitting the person to relax and remember."

The doctor explains that men and women may be entirely innocent of any wrongdoing, yet they are hostile to inquiring police "merely because authority to them

(Continued to page 234)



Self-Expanding Trailer Becomes Camp Home

EVERY YEAR the nation's camping-trailer manufacturers go a bit further in their contest to see which can cram the most possible living and sleeping space into the smallest folded package. A new trailer expands electrically from the neat, low-slung package in the top photo to the full size 15-foot trailer at left below. In the minute that it takes to expand itself, the inside sprouts a gas floor furnace, gas stove, sink, closet, dining area, two beds and a couch, all of which fold up or down out of the walls as the roof is raised. An interesting new feature is full glass-fiber insulation. The inventor, Leo Hagenson, won a grand championship ribbon at the Minnesota Inventor's Congress for his work on the trailer.



P2V Neptune patrol bomber grabs the pickup line at 500 feet and 125 knots. Pickup yoke is on its nose

500-Foot High Jump

MARINE Gunnery Sgt. Levi W. Woods, at right, is experiencing the first pickup of a man by a high-performance aircraft — and winning himself the Navy and Marine Corps Medal for volunteering for the job. With the new system, the rescue plane drops a kit containing 500 feet of nylon line with a balloon on one end and a lift harness on the other. The rescuee inflates the balloon from a helium cartridge, then straps himself into the harness. The plane intercepts the line with a pickup yoke, then hoists the man aboard. The nylon line cushions the shock.



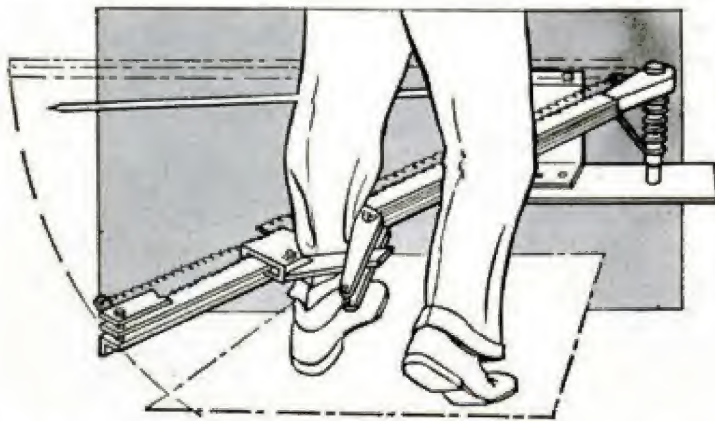
Sgt. Woods, none the worse for his trip, is carefully lifted into the rescue plane through a belly hatch





"Live Water" Aeration Cuts Swimming Pool Algae

Built into the filtering and circulation systems in a swimming pool, a new aerating system retards algae growth by depriving the algae of their chief growth-producing element, free carbon dioxide in the water. Since algae consume chlorine, the result is that the pool's chlorine residual is maintained much longer. The system picks up air through an intake tube, mixes it with the filtered water and releases the aerated water through outlets in the floor. It is not practical for addition to existing pools.



Arm on Electric Trap Grabs Burglar's Leg

Burglars and prowlers get a sudden and disconcerting surprise with a trap recently invented and patented by David Sweigart, of Wilmington, Del. When an intruder steps on a signal mat, it closes an electric circuit and a metal bar, concealed within a wall or under a safe or counter, suddenly is released. As the bar strikes the leg of the person who has sprung the trap, clawlike arms grab his leg.



Merry-Go-Round House For Japanese Hens

Even the chickens are profiting from an automation boom in Japan! In operation at Okayama, a seven-story "apartment house" for chickens does everything but lay the eggs for the hens. An electric motor rotates the house, causing it to make a complete circuit every 38 minutes, stopping five minutes on each revolution to allow the birds to feed and drink from three food boxes on each story. The attendant remains in one spot to fill the boxes. Instead of keeping 420 separate boxes filled, he has only 21 feed boxes to look after for the entire 420 chickens in the house. The machine is so geared that three cages on each floor stop for five minutes every 38 minutes, feeding 21 hens each turn. In appreciation for such deluxe service, the chickens readily lay eggs which roll forward on a small ramp to be collected.



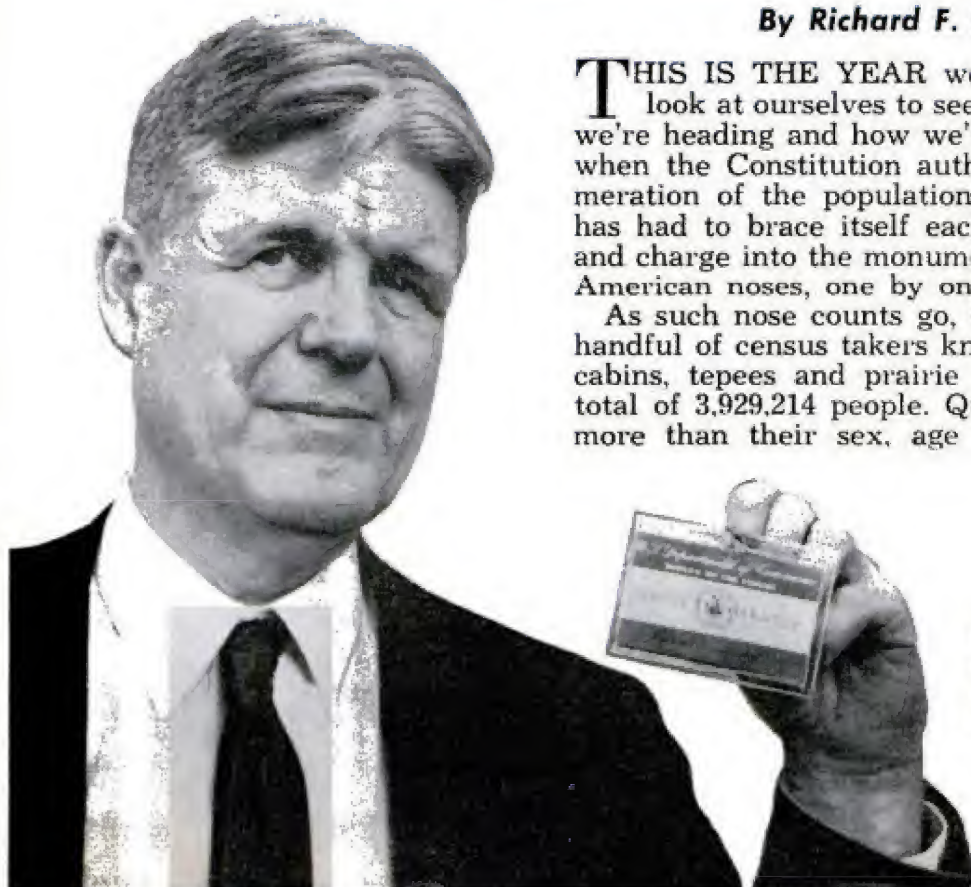
Census-taker's visit will be short this year. Mainly he (or she) will check the mailed do-it-yourself form

NOSE COUNT, 1960

By Richard F. Dempewolff

THIS IS THE YEAR we count off again, take a look at ourselves to see how we've grown, where we're heading and how we're doing. Ever since 1790, when the Constitution authorized a "decennial enumeration of the population," the Bureau of Census has had to brace itself each year ending with zero, and charge into the monumental task of inventorying American noses, one by one.

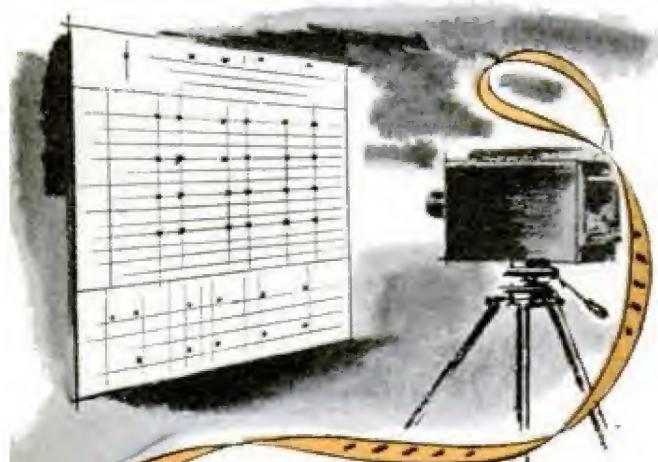
As such nose counts go, the first one was easy. A handful of census takers knocked at the doors of log cabins, tepees and prairie dugouts to smoke out a total of 3,929,214 people. Questions determined little more than their sex, age and whether they were



Burgess, Director of Census Bureau, warns citizens not to admit any "census taker" unless he shows this identification to you
Henington Rand photo

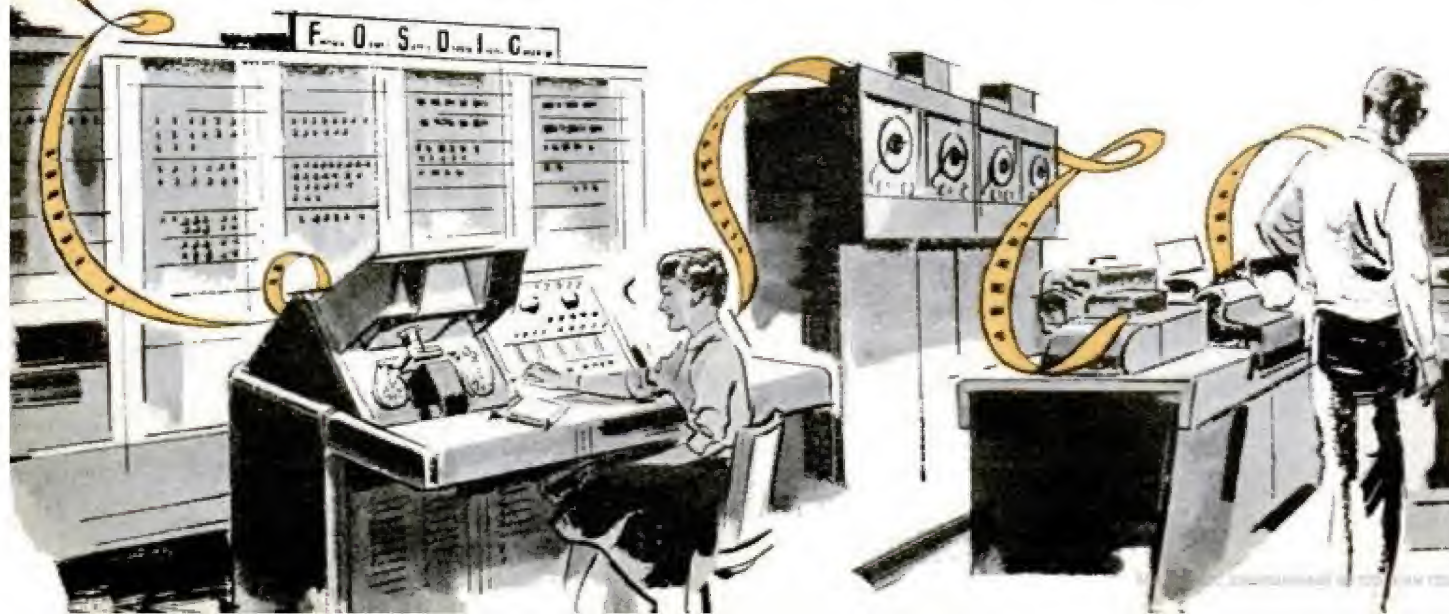


1. CENSUS TAKER calls at each home, checks the answers on the previously mailed do-it-yourself form, and transfers the information in the form of circled dots onto a special sheet he carries



2. ENUMERATOR'S completed forms are rushed to census office in Indiana, where a battery of 30 cameras records them on microfilm. Two census sheets click through the cameras each second

3. REELS of microfilm are shipped to headquarters in Maryland, where they are fed through FOSDIC, the new electronic wizard. FOSDIC converts data from each form into pulses on a magnetic tape



freedmen or slaves. But the population soared with each succeeding census. More and more agencies added questions to the census taker's list to prod, poke and explore Mr. and Mrs. Average American, and see what made them tick.

For its 1960 population and housing census, the Bureau, now the granddaddy of all U.S. polling agencies, will face what probably will be the most staggering house-to-house canvass in history. Not only must it rap on more than 60 million doors to tally an estimated 180 million Americans (an increase of 30 million over 1950), but it must collect answers to some 60 questions designed to reveal trends in our living standards, social structure, family relationships, occupations and myriad other things.

To do the job, census experts have been busy building a complex array of brand new devices and systems. This year, for the first time, take-your-own-census forms will be mailed to every home in the country. In the sprawling corridors of the Department of Commerce Census Building in Suitland, Md., just outside the nation's capital, rows of new electronic computers are warming up to gobble the billions of figures that soon will be pouring into them. Newest phenomenon is a complicated group of electronic cabinets and consoles reminiscent of the gear in a Cape Canaveral blockhouse. It is known as "FOSDIC" (Film Optical Sensing Device for Input to Computer). This monster will transfer all the data collected from you and me to magnetic tape—performing in an instant a job once tediously handled by 2000 punch-card operators.

Gigantic UNIVAC 1105's will swallow the tape as fast as it is produced, digesting its magnetic pulses and spewing out masses of coded census figures on request. Fed through new high-speed electronic printers, UNIVAC's taped "summary" codes

4. TAPE from FOSDIC then is run through the big UNIVAC. This electronic brain can be instructed to pick out and summarize any specific information. It tallies the particular results on a summary tape



Remington Rand photo

Three years before the census, Bureau cartographers were working over huge maps to split country into districts

will be magically transformed into readable statistical tables ready for the printer.

As a result of all this high-speed wizardry, population totals for counties will begin to make their appearance no more than two weeks after the census is completed in mid-April. By fall, official figures for all areas will be announced. And by December 1, 1960, final census figures will be presented to the President by the Secretary of Commerce. In spite of the in-

crease in population, publication time for various phases of the new decennial census will be speeded up by six months to a year-and-a-half! The entire incredible report will fill 100,000 printed pages in a stack of volumes more than 10 feet high.

Regardless of all the new "gee whiz" census wonders, the good old census taker, or "enumerator," must still make his rounds to check the do-it-yourself forms and code your answers on sheets for microfilming.

IN THIS WAY the Census Bureau can quickly learn any particular fact or facts about an estimated 180 million Americans. Also, UNIVAC will come up with trends and ratios, which have not been spotted in past

5. SUMMARY TAPES from UNIVAC will move through electronically controlled high-speed printers which will read the magnetic impulses and turn out statistical tables at the dizzy rate of 600 lines per minute





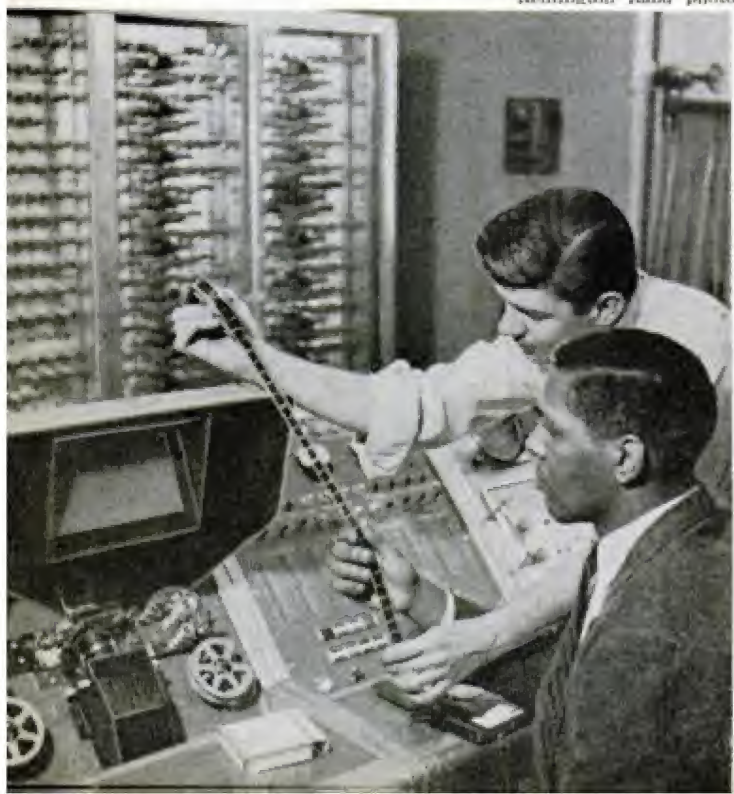
At control console of UNIVAC, operator sets up circuits to produce any desired set of figures

Remington Rand photo



Electronic eye of FOSDIC scans each frame of microfilm. Below, operators prepare reel of the film

Remington Rand photo



On April first, 160,000 of these politically appointed door-to-door canvassers—largely housewives, widows or part-time workers—will set out armed with 1,080,000 pencils, 260,000 pocket-type sharpeners, 2,850,000 scratch pads, infinite patience and considerable ingenuity. For two weeks they will explore every nook and cranny of the United States—including the new states of Alaska and Hawaii, as well as Guam, American Samoa, the Virgin Islands, Puerto Rico and the Panama Canal Zone.

To make the job easier, the Bureau has divided the nation into 250,000 enumeration districts, so that each census taker will list facts about 1200 people, covering 350 to 400 dwellings. Months ago, in the Suitland map department, you could have watched cartographers sprawled in stocking feet on rug-size maps spread across the floors. They worked from an avalanche of up-to-the-minute city, town, county, highway, topographic, soil and aerial maps constantly pouring in from all over. Every change since the last census, no matter how small, went on the master charts—new homes, new streets and highways, old streets blocked off, old buildings condemned for demolition, changes in boundaries of towns and cities due to shifting rivers, new dams and exploding populations. When he sets out from one of 400 district offices operated by some 10,000 supervisors, each canvasser will carry with him a set of yard-square maps detailing every latest innovation in his territory.

But map or no map, there's no blueprint for what the enumerators will find. They will knock politely for admittance to cardboard huts in hobo jungles, glittering penthouse apartments, mansions and row houses. They'll call at homes converted from chicken shacks, old railroad cars, caverns, mine tunnels and barn lofts. They'll visit traveling circuses, nudist camps and remote lighthouses.

To ferret out every possible citizen, these determined scouts will travel some 28 million miles, bouncing over lumber trails in jeeps, hiking up mountains and scaling cliffs to lonely fire towers. Some will skim across snow-covered Arctic tundra on dog sleds and snowmobiles to enumerate back-country Indians and trappers. They'll row boats through dismal Florida swamps to tally the shy Seminoles. Some will be bitten by dogs, chased by bears, scratched by cats, or attacked—as one was last time—by a flock of turkey gobblers.

If history is any criterion, they'll meet with a wild assortment of adventures.

During the last census, some enumerators found themselves rushing sick and injured children to the hospital, breaking up family quarrels, and—as happened in one



Every 10 years, some enumerators in Alaska set out by dog sled to smoke out every settler, trapper and Indian

case—notifying authorities of a freshly committed murder. One nose-counter arrived just in time to join a bucket brigade for a burning house he had come to enumerate. Another was refused admission to a nudist camp because he wouldn't remove his clothes, and had to appoint a member nudist to do the job for him. More than one census taker has turned midwife when a new addition to a family arrived simultaneously with him.

For the most part, people are inclined to cooperate, but an interviewer never knows what he's going to be up against. In the last national countdown, a lady compiler had to tight-rope-walk a wobbly log crossing a mountain stream to reach some cabins when the occupants wouldn't come out. She fell in twice—once going and once coming. Even less hospitable was the grumpy prospector who invited a lady census taker to sit on a mound of earth nearby while asking questions. Things got pretty lively after about the second question when the ants swarmed out.

Many people will not stop what they're doing to oblige the interviewer, but have no objection to answering questions on the run—such as the painter who bellowed his personal affairs to the whole neighborhood from the top of the ladder he wouldn't descend. At another stop, an enumerator had to help a busy mother hang out the week's wash during the questioning.

Actually, refusal to answer census ques-

tions can result in a \$100 fine, or two months in jail. But once the enumerator explains that everything is confidential by law, and that even the Internal Revenue Department can't check the family-income figures, few objectors hold out. There are some favorite "wrong answers" the enumerator must watch for, however.

"Wives like to upgrade their husbands," explains one census official. "The mate of a trolley conductor or a locomotive driver may list him as an 'engineer,' for instance. And many women tend to round off their

(Continued to page 260)

Here's the final result of the 1950 census—four tall stacks of books that took two years to publish





Pill Detects Water in Jet Fuel

Detecting small amounts of dispersed water in jet-airplane fuel has been greatly simplified by the development of a "pill" treatment by Esso Research and Engineering Company. A capsule, dissolved in a small fuel sample, changes color at any sign of water within one minute.



Balancing Mount Stabilizes Camera

Jumpy movies caused by camera motion can be avoided with a simple, seven-pound aluminum camera mount fitted with compensating weights. Held at its balance point, it gives the camera near-gyroscopic stability even in a boat or a moving car; helps with regular movie making, too.

Geodesic Canopy Can be Assembled by Homeowner

Readily assembled from fabricated parts, a geodesic canopy provides a 23-foot circle of protection from sun and rain. No special foundation is required other than anchors

for the V-columns. The canopy may be erected over a patio, in a back yard, beside a pool or at a campsite. A hard surface, such as concrete may be placed under it.



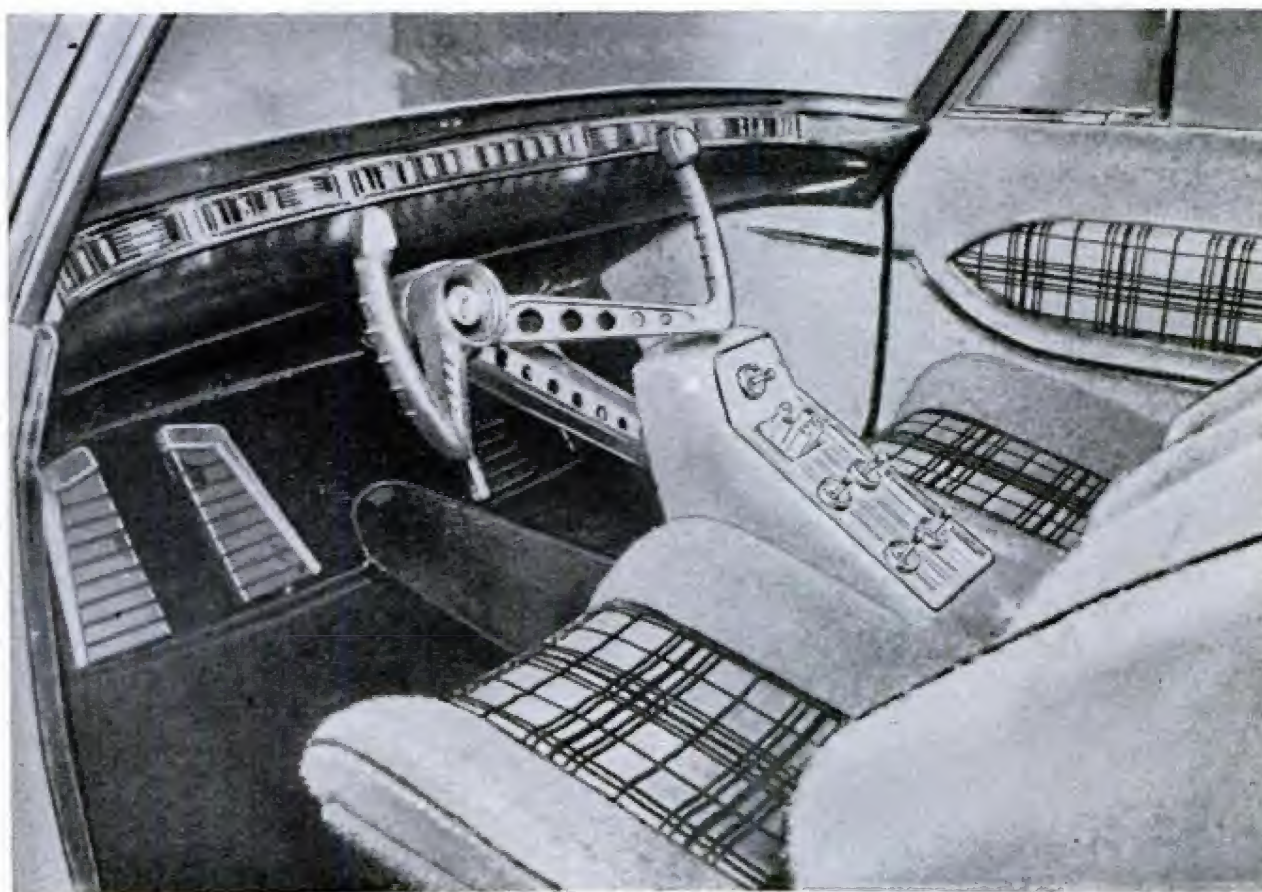
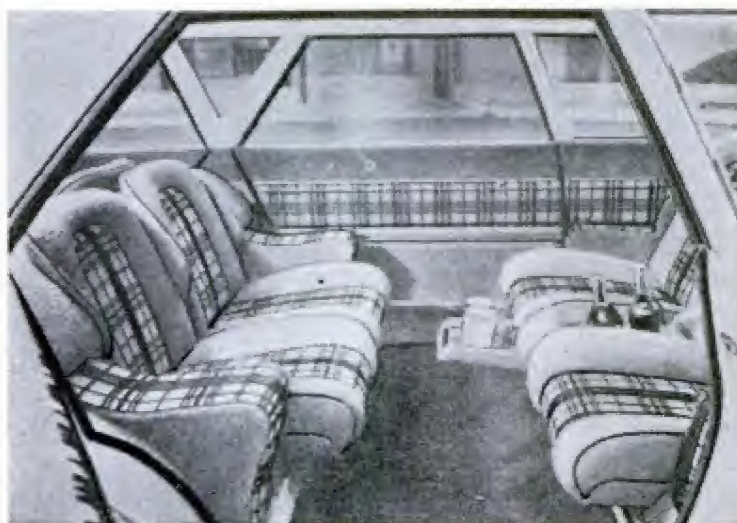


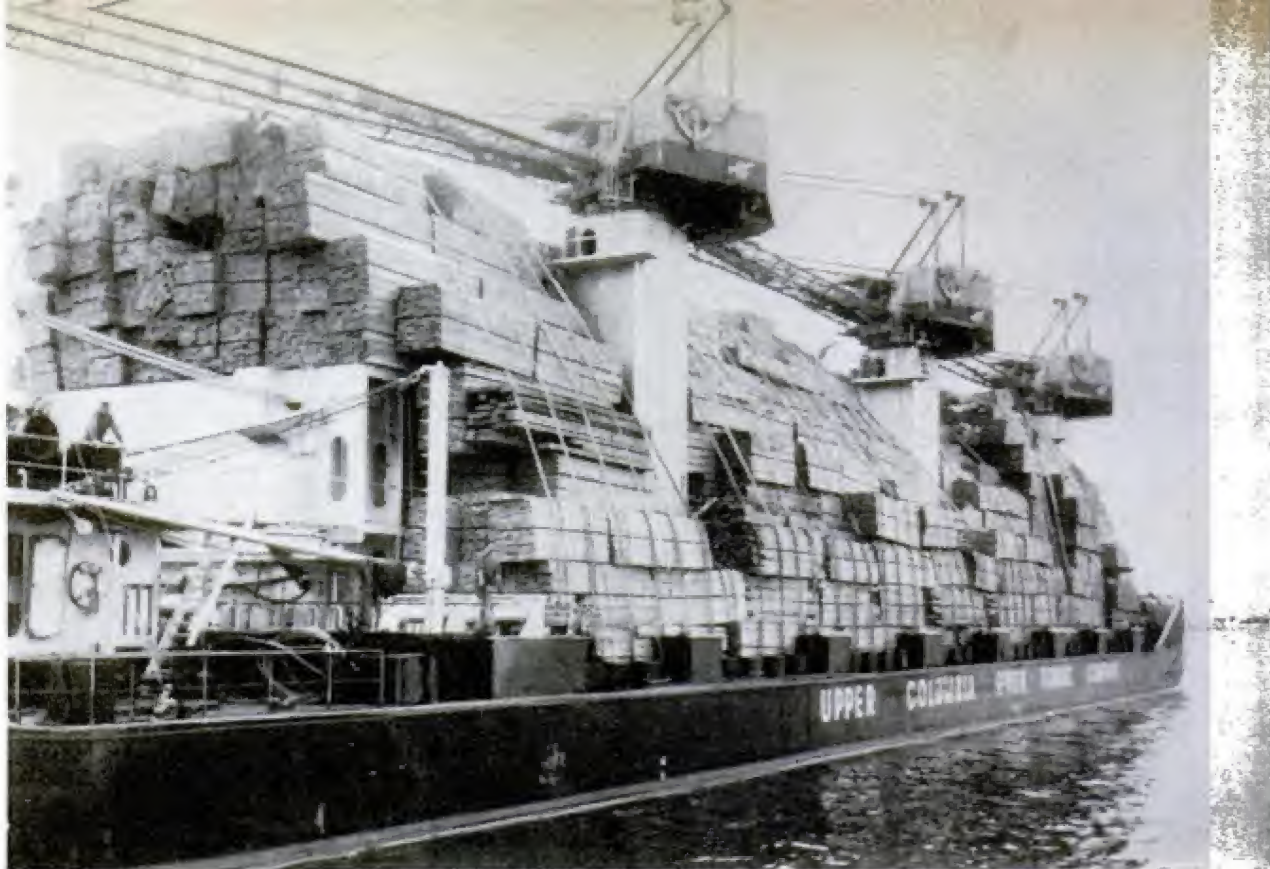
Which way is it going? It takes a close examination to tell, but Selene's front end is at the right

It Might Fly If It Had Wings—or an Engine

AIRCRAFT-TYPE styling gem by the famed Ghia car body manufacturers, the Selene was created by the Italian company as a show car. The auto has no engine. Its purpose is to show what might be expected in car styling of the future. Two back seats, facing each other, give the back compartment a lounge-room effect, complete with bar (right). Sliding airplane-type steering wheel and double sets of instruments would allow the car to be driven from either side.

Dream car deluxe, Selene has a steering wheel that pivots to either side (below). Rear (right) resembles airplane lounge





Like the girl on the barbershop calendar, this barge is really stacked. It is stacked high with 4,600,000 board feet of lumber. It hauled this huge load along the Pacific Coast from Washington to California

Look—No Mom!

Electronics has freed bovine mothers from dinnertime chores. An electronic calf feeder, in which water and calf-food powder are stored, mixes and warms the solution as needed — and dispenses it on demand.



Extended-Shell Spark Plug

Longer electrode life is claimed for a new spark plug that has an extended shell, rather than merely an extended tip. This keeps the gap deep inside the combustion chamber, but shortens the side electrode, thus reducing damage from erosion.



EXTENDED SHELL

POPULAR MECHANICS

In Search of Plants That Cure

By James Joseph

AN ARMY OF MEDICAL EXPERTS, outfitted with walkie-talkies, aqua-lungs and mobile labs, is pushing into the four corners of the globe—and into every American back yard—in search of plants that cure.

Often a search is started by a rumor like this: From the milk-white sap of a jungle herb, a witch doctor has been extracting a potion that cures insanity.

Soon, deep into equatorial Africa plunge the botanical sleuth and his party. The assignment: Find the witch doctor and his "magic" herb.

The sleuth, his interpreter and two porters are outfitted with some modern magic—a solar-powered phonograph, Polaroid camera and VHF radio transmitter. A day's march down the trail from their jungle location is tethered a dugout, rigged with a 60-horsepower outboard motor. Down-river still further stand a four-wheel-drive Land Rover and air-conditioned trailer. In the trailer are a diesel-powered shortwave radio and lab.

Now, squatting before the red-robed witch doctor, the medical expert conjures magic . . . from the phonograph. And more magic yet, as he hands the old man his Polaroid-snapped picture.

Suddenly the African grins, rummages in his bag of tricks and offers a withered plant.

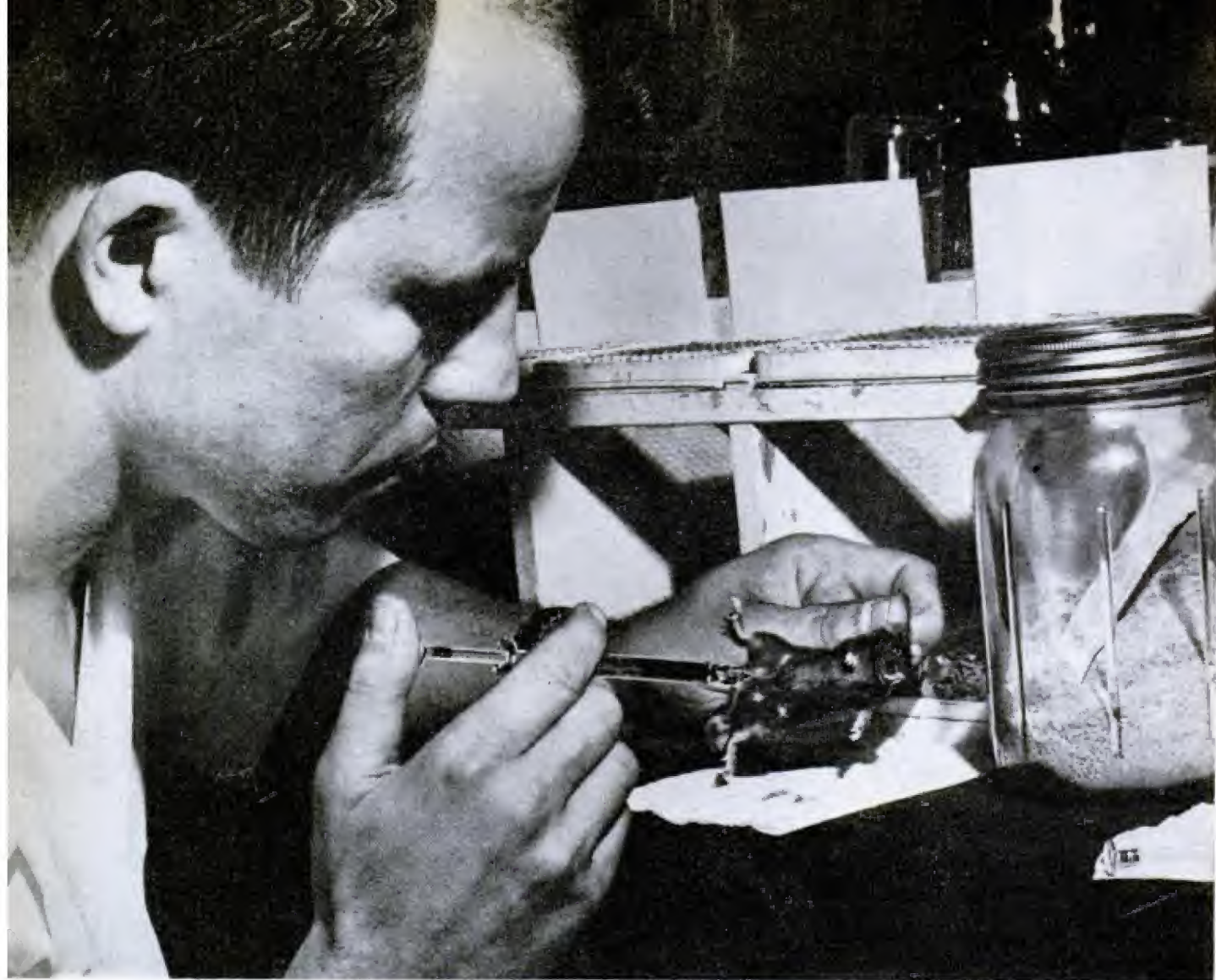
Instantly, the plant sleuth recognizes its familiar leaves and flowers. It's a weed common to every back yard in America, yet a plant that no medical researcher has as yet thought to investigate!

Moments later, in the garbled code which only he and his employer—a pharmaceutical company—savvy, the jungle explorer is flashing the word Stateside, via a dozen radio relays.

"Investigate plant L57-67 . . . as possible cure for insanity."

He's fired the starting gun in a race extraordinary. It's a race to extract from the plant its secret cure which, should it prove medically valuable, could mean solace for many among the U.S.'s nine million mentally afflicted . . . and a king's ransom, upwards of \$100 million, for the drug

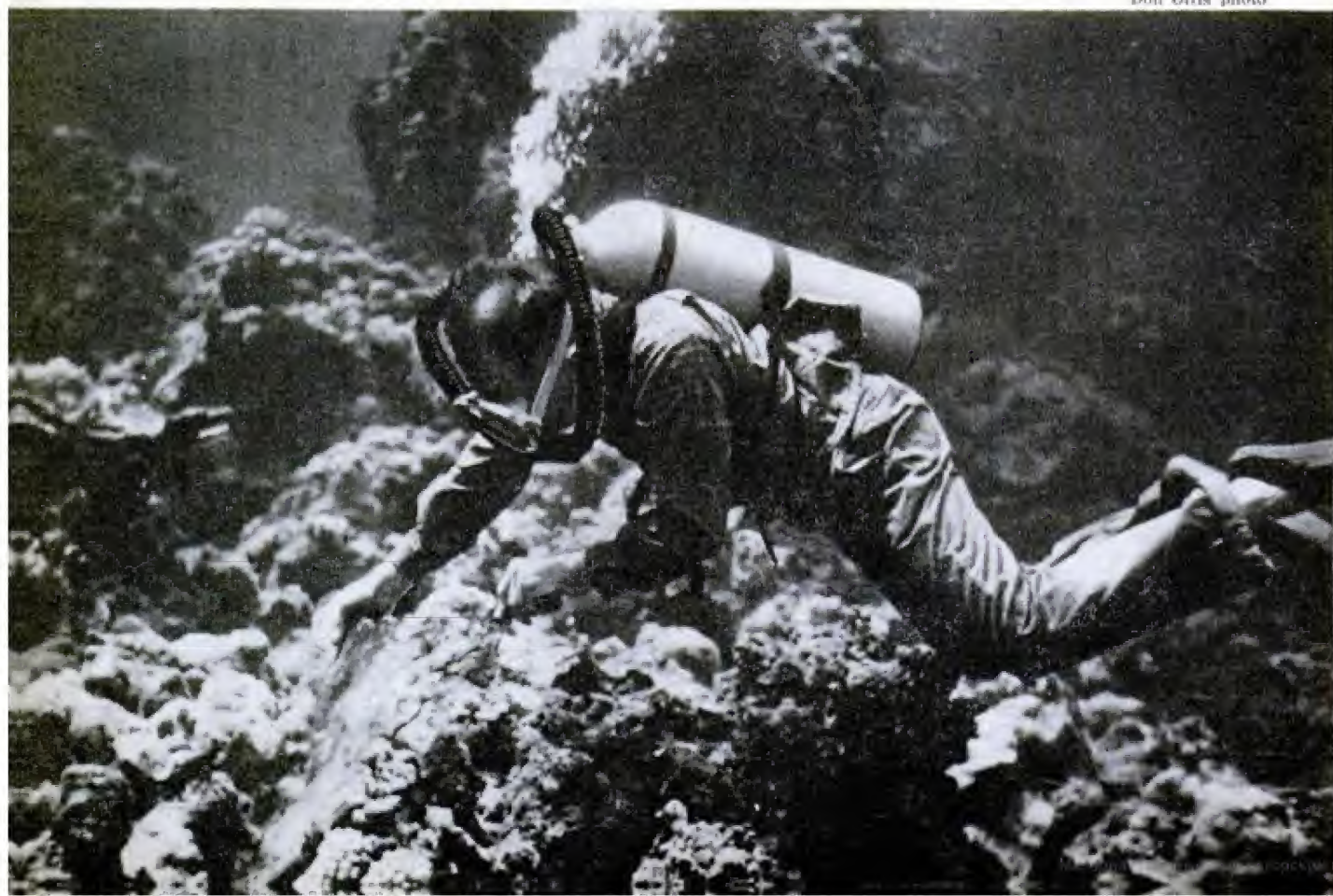




Possible cancer inhibitor, taken from a still-secret African plant, is injected into a cancerous mouse

Equipped with an aqualung, Dr. E. Yale Dawson collects algae plants on a coral reef in the tropical Pacific

Don Otis photo



company that is first to place it on the market.

L57-67? Though its identity is shrouded in secrecy (for plant sleuthing is a high-stakes, tight-lipped profession), it is a plant common to your yard and mine. A weed which perhaps only recently you disdainfully plucked from between your petunias.

"As yet, though," admits Egyptian-born Dr. Saleem A. Farag, who bosses a world-roaming team of plant detectives from his headquarters at the College of Medical Evangelists, Loma Linda, Calif., "we haven't succeeded in isolating L57-67's active—and perhaps curative—ingredients. But the plant looks promising."

L57-67 and thousands of plants just as medically promising are objects of a global search unparalleled in history. Combing five continents and the seas are more than 1000 plant detectives—men like botanist John Wurdack of the New York Botanical Gardens. Backed by Yale University and Eli Lilly & Co., a leading drug maker, Wurdack is beating through the jungles of Venezuela in search of plants that cure.

"Certainly Mr. Wurdack will seek out witch doctors and even headhunters if they deal in tribal medicine," says an associate.

Startling though that admission is, it underscores a medical paradox: Some of the world's top medical experts are paying a kind of belated homage to primitive healers. And with reason. For, though the test tube has synthesized some remarkable cures, it has failed to find answers to many of man's most dreaded diseases—including cancer.

U.S. drug companies this year alone are gambling \$5 million to outfit plant safaris both here and abroad in the belief that there may be more fact than fiction in witch-doctor remedies, medical folklore and tribal cure-alls.

Backed by a four-year, \$240,000 grant from big Sterling Drug Co., Dr. Donald Brown, a medical botanist, recently headed for Tanganyika, East Africa, where he'll coordinate plant gathering among the Seventh-Day Adventists' 197 world-flung hospitals, many of them set deep in primitive wilds. Before Dr. Brown enplaned for



African studies his picture—quick-photo "magic" used by some plant hunters to wring from primitive healers their plant secrets

The magic works, and the witch doctor plucks a familiar plant—a common weed in America which no one had yet investigated





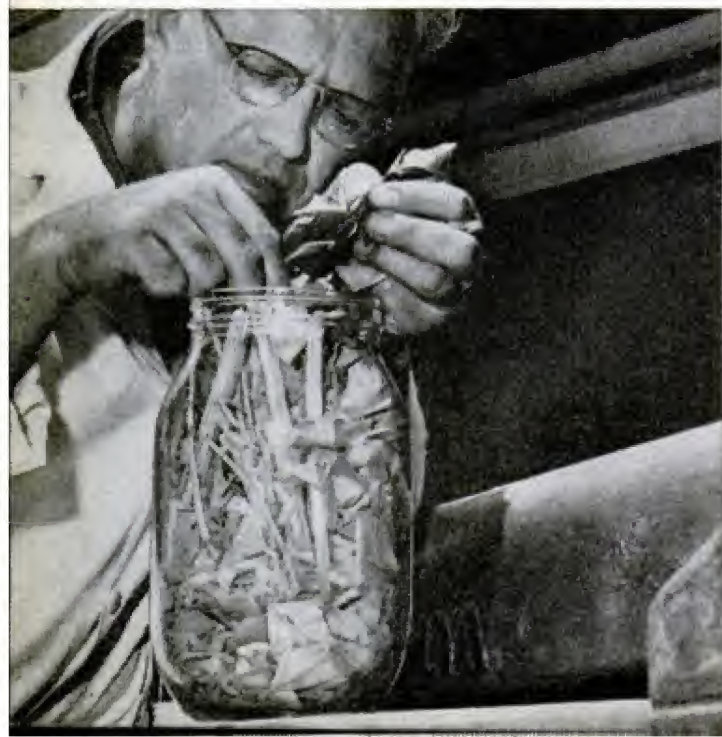
In an improvised jungle laboratory, Dr. Dawson studies his collection of plant specimens. This laboratory is located on Jaluit Island in the Marshalls

Don Ollis photo

Nairobi, he shipped ahead a mechanized lab: A spanking new $\frac{3}{4}$ -ton, four-wheel-drive Ford pickup truck, rigged with a sportster camping body and pulling a field lab compacted into a two-wheel, eight-foot-long aluminum trailer.

Charles Pfizer & Co., Inc., another major drug house, has organized throughout South America a vast net of plant suppliers who use outboard-motored dugouts, diesel launches, seaplanes and even helicopters to harvest rare and hard-to-reach plants. CIBA Pharmaceutical Products, Inc., which air freights Indian root plants fresh from Asian jungles to its U.S. labs, is right now bolstering its global army of plant sleuths.

Dried and bottled, a plant that shows promise as a cancer inhibitor is inspected by Dr. George Nelson



North Chicago's Big Abbott Laboratories, though fielding no full-time plant gatherers, looks to its world-wide corps of drug salesmen to send back plants and soil samples (the latter for antibiotic research). Only in 1957, Abbott announced discovery of a drug which combats atherosclerosis (the artery-hardening disease which annually kills 200,000 Americans). Basis for the new drug: Oil pressed from the seeds of the East Indian safflower, a thistlelike herb whose American relative is the common garden aster.

The gamble, a calculated one, is based upon what some medical researchers call "documented medical magic" . . . performed by tribal medicos or recorded in the annals of folklore, including American.

"We're literally leaving no plant unturned," confirms Dr. Farag who not long ago brought back 80 plants regularly used as "medicine" by East Africa's primitive Ha tribe.

"Our search," he continues, "is reaching into every American back yard. There's just no telling about a plant until it's been squeezed dry of its secrets."

- The cinchona tree of South America held such a secret—quinine (a secret well known to Andean primitives long before Spanish conquest). Quinine, though now grown in Java and rivaled by man-made atabrine, is a staple antimalarial drug.

- As typical is curare, the plant-derived poison which turns lethal many an Amazon arrow. "Discovered" by modern medicos only in 1938, though long known to jungle savages, curare is a "miracle" drug—a top-

(Continued to page 239)



TO ENTERTAIN passengers on their long nonstop international flights, TIA, a French airline, tried to install movies, but could not make them visible simultaneously on both sides of the partition that separates the tourist class from the first-class cabins. To solve this problem, Pathé engineers in Paris designed a double lens-prism projector which throws one picture on the screen mounted forward in the tourist cabin, and diverts another image to one side toward a smaller screen in the rear cabin. The regular public-address system carries the sound track. The "Pullman berth" folding projector saves space but also provides a shock and vibration-free mount for the projector.



The Moons Shine Down on Austin



By Dev Klapp

A STRANGER SELDOM FORGETS his first glimpse of Austin, Tex., if he approaches the city by night. For he sees strung before him clusters of pale blue will-o'-the-wisps hovering without apparent support high above the city. The sight is indescribably weird and leaves a deep impression on anyone who doesn't know about Austin's famous tower lights—



the only ones of their kind in the world.

They are a sort of lamp-in-the-window to homecoming natives, a romantic setting for amorous couples and a strong tie to the past for older folk.

Built in 1894, these unusual lights were once the city's only source of illumination, though they now supplement a more expansive lighting system. When they were erected, they met rigid specifications: Each light had to illuminate a circle 3000 feet in diameter brightly enough to make readable the numerals on the dial of an ordinary watch. Total cost was \$154,000.

The lights were turned on in 1895. And since that day these manmade moons have shed their soft blue radiance over the city every night through all sorts of weather.

The frail-looking metal towers were well constructed, for now, after 65 years, all but four of them are still standing and in use every night.

Of the four lost, two met violent ends. A hurricane destroyed the first, and in 1946 a city bus swerved from the street and crashed into the base of the other. There was a terrific impact. Guy wires snapped, curling about the silvery framework as the tower buckled and fell. The tower settled its full length along busy Guadalupe Street, without scratching a car, marring a building or injuring a person.

There has been tragedy connected with these lights because of the allure of their height. Climbers have challenged the towers despite the difficulties placed in their way by engineers who set the framework of each tower atop a 15-foot smooth pipe.

Such a barrier, though, doesn't discourage small boys. More than once the fire companies have been called to bring down some youngster clinging in terror to the metalwork. In 1929 a boy climbed to the top of the Ninth Street tower. As he

Base of each tower is a smooth steel pole which discourages most would-be climbers — but not all

reached the final rung in the ladder, he lost his grip. Luck was with him that day, however, for he fell the entire length of the structure, bouncing from side to side, and landed on the iron catwalk 150 feet below—without breaking a bone or suffering serious injury. The escape was so unusual that the incident and boy were featured in Ripley's *Believe It or Not*.

Not so fortunate was another venturesome youth who, a few years ago, climbed the same tower. He was seized with vertigo, lost his hold and fell to his death.

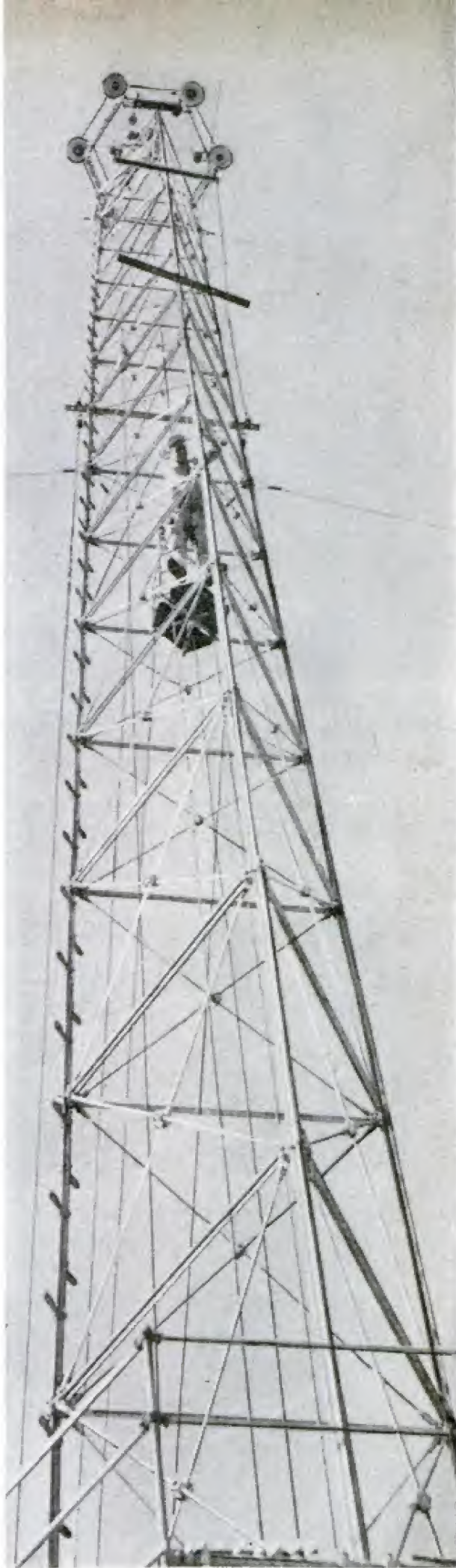
These are the only two recorded accidents. But there are many stories told about the Austin lights that have a lot of humor in them. One of the best is about the early days when Austin had its share of come-to-town-shoot-'em-up cowboys. According to this tale, which is claimed to be true, a ranch hand, accompanied by his buddies, rode into town one Saturday night and began shooting it up. After emptying his sixshooter several times at the new-fangled lights without result, this cowpoke sought out the sheriff and raised a rumpus about the ——— things being strung too high for good shooting.

Now and then some parsimonious councilman introduces a motion to do away with the tower lights as needless expense, but he is always voted down at once. The gravest threat to the tower lights came during the war years when it was suggested that they might be hazardous to aircraft. But the idea of destroying them was finally abandoned, and seemingly in justification there has never been a collision, though two airfields are located near the city.

Austin's tower lights are not crumbling relics. They are kept in top shape and are an integral part of the city's lighting system. The original carbon lamps were later replaced by incandescent lamps which were used until changed to the new vapor lamps. There is one headache, however, in keeping them operating efficiently—and that is maintenance. Being the only lights of their kind in the world, they have no ready supply of spare parts. So the four towers that fell have been carefully husbanded and their skeletons used to keep the remaining 28 in repair.

Even though modernized, Austin's unusual lights retain their original charm, for no basic change has ever been made in their structure. And though romance probably didn't enter into the calculations of the city fathers when these lights were erected, the fact remains that no other city can deliver moonlight to its boys and girls 365 nights a year simply by throwing a switch. ★ ★ ★

Yearly coat of aluminum paint is typical of the care that has kept the towers in good shape since 1894

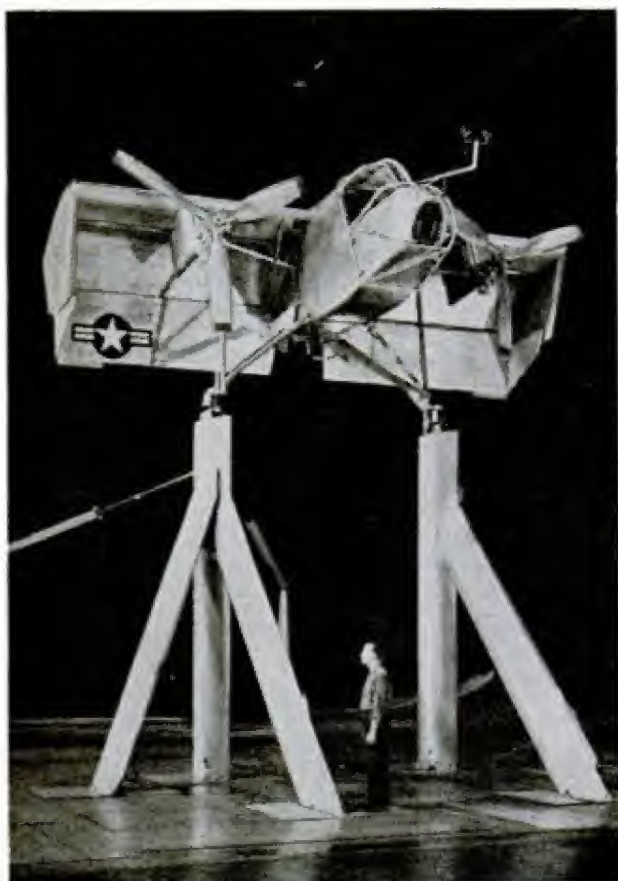




Giant Pipes Support Bridge to Swedish Mainland

Crossing the 918-foot gap between Tjorn Island and the Swedish mainland is an unusual bridge that will be completed this summer. Supporting it are two parallel pipes arching from shore to shore. Pipe sections, over 12 feet in diameter, were carried

to the site by boat, hoisted in place and riveted together. Pylons and suspension cables were removed after serving to aid in erection. Engineers chose pipe construction after testing models in a wind tunnel. The bridge is said to be largest of its type.



Vertiplane Really Puts Flaps Down!

Already flyable, the Ryan Vertiplane—it has large, retractable wind flaps to deflect the slipstream of propellers for vertical takeoff—is undergoing further wind-tunnel tests at the National Aeronautics and Space Administration center, Moffett Field, Calif. One gas turbine powers both propellers.

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Bridge for Gymnasts Arches Across Pool

Swimmers who like to invent new ways to enter and leave the water should find a new swimming-pool bridge a source of entertainment. Slightly arched and resilient,

the bridge is available in various lengths. It is made from two one-foot-wide aluminum sections topped with $\frac{3}{8}$ -inch plywood, is strong enough to hold 12 gymnasts.

Rome Being Built in Our Day

Pausing to view the famed Colosseum, this cardboard figure of a tourist is a forerunner of tourists of tomorrow who will be able to wander through the streets of ancient Rome, viewing the city as it looked at the height of its power. A model of Rome is being built in the present-day city to permit future visitors to see it as it was in the time of Caesar. Models of the Colosseum and surrounding buildings are part of a small plastic representation of the famed city that has been constructed as a pilot model for the permanent display which will be built on a larger scale.

☐ Soon to be built in Puerto Rico, a huge radar antenna will be used by Cornell University scientists to probe the surface of the planet Jupiter.

☐ Radio signals, reflected from ionized air left in the path of meteors, have been used to transmit messages 40 times as fast as teletype machines.



UPI photo
129

The Church That's



From a perch on the roof, Father Francis Dales supervises the shingling job during construction of the straw chapel in Sexsmith, Alta., Canada. The straw walls have not yet been covered over with stucco



Father Dales, an adept carpenter, not only did the design work himself but helped build the church

DESPITE THE NURSERY TALE, huffs and puffs won't necessarily blow down a straw building. The proof is a chapel of straw which stands in the Peace River region of Alberta, Canada, where winter winds and 40-degree-below-zero temperatures are standard fare.

The chapel is the fond effort of Father Francis Dales who, since coming to Alberta in 1950, has helped build community halls, churches, homes, and schools.

The straw construction was the idea of Father Dales' late brother, an Ontario contractor. But the priest designed the structure himself. It seats 50 persons.

Bales of straw were piled on a concrete foundation to form walls. Pipes bolted together between rows of bales compress the straw and hold it in place. Wire and stucco cover the exterior.

To help raise the \$605 that it cost, Father Dales designed six private homes and a \$70,000 church (which he also helped build). The community's Protestants and Catholics alike pitched in to build the straw chapel. ★ ★ ★

Built of Straw



Bales of straw—plentiful around Sexsmith which claims to be grain capital of the British Empire—placed on concrete form the walls. Below, with steeple in place and the walls stuccoed, the chapel is almost finished





Ships Dock in Huge Mass of "Soap Bubbles"

Detergents from nearby factories make a foamy bed for ships at a lock in the River Neckar at Stuttgart, Germany. Factories

deposit the detergents in already dirty water, making the river unfit for swimming. Fish cannot live in the water either.



Wind-up Plug for Bass

One of the most important tricks of successful bass fishermen is the ability to keep a surface lure moving, however slightly, without retrieving it from the productive water along shorelines or weed-beds. For many years lure designers have worked to develop a lure that would move without being pulled through the water. This lure is designed to move like a drowning animal; its back "legs" are powered by a rubber band which is wound up by the angler. A plastic-and-wax compression disk between the body and the legs retards the unwinding action so the plug operates for at least a couple of minutes after landing. (Two spare disks are supplied with the lure, though one disk should last through a season of ordinary use.) In the water, the legs rotate, kicking up a fuss without moving the plug. The angler keeps a tight line and waits for the strike.

At any given moment, the U.S. Air Force has 1000 aircraft airborne somewhere in the world; these planes fly an average of 4800 miles every 60 seconds.

POPULAR MECHANICS



Measuring the flow of water in a river means half a day's work for members of Northern Rhodesia's hydrological section. Below, evaporation of water is calculated to learn the true capacity of a dam

These Men "Operate" Rivers

Members of the hydrological section of Northern Rhodesia's Irrigation Department spend countless hours tediously measuring rainfall, the flow of rivers and the depth of water in dams. Their job is to end flooding and provide electricity in rural areas. They must decide where dams should be placed, where irrigation and hydroelectric plants should be built. Their dream is to stop in the future such damage as the flooding of the powerhouse at Livingstone and the cofferdam at Kariba.



Hey! Look at the Blonde!

Motorists approaching a cafe near Atascadero, Calif., often find their attention caught by what, at first glance, seems to be a comely waitress. Their second glance, of course, takes in the cafe sign—as the manager had planned. The attractive blonde waitress is a costumed window display dummy.



☛Lithium, lightest of all metallic elements, has been alloyed with aluminum to form the skin of the U.S. Navy's supersonic attack-bomber, the A3J Vigilante; the new alloy gives a three percent weight saving over conventional aluminum compositions used on present aircraft.



SNEAK UP ON THE BASS

At right, here's how, with a trolling motor mounted offcenter beside the regular motor. At left, here's why — four "braggin' size" Texas largemouths



Increasing popularity of small electric trolling motors brings an electrical age to fishing

By Russell Tinsley

ANYONE WHO has ever fished for bass will sympathize with my predicament. It was a typical late-March Texas afternoon, hot and windy, and the gusty northeast breeze whipped the waters of Granite Shoals Lake into a rough chop which tossed my boat around like a fisherman's cork bobber. I was working off a rocky point jutting into the lake, trying to maneuver into position so that I could cast along the slope where the shallow waters faded into deeper depths. Each time I drifted past and prepared to cast, the wind promptly blew me out of strategic position.

I was fishing a jig, a weighted bucktail lure which requires an ultra-slow retrieve along the bottom for best results. There was no percentage in a snap cast and a hasty recovery. The sensible thing for me to have done, naturally, was anchor and fish that stretch of water properly. But I was in a hurry to fish down the shoreline and didn't figure the spot was worth the time or effort required to lower and raise the anchor.

I was cussing the wind and struggling with a paddle to keep from being washed ashore when my friend Kenneth Gumm motored up. "Have you fished that point yet?" he shouted. I shook my head. Switching off his outboard, he cut on the small electric troll-motor to his left on the transom. Gradually he crept into position, flipped his bait at a tangent to the rocky point and brought it back slowly. Suddenly he was fighting a half-moon rod and beyond the point a pugnacious bass shattered

the water surface as it catapulted skyward. Shortly Ken had the fish flouncing helplessly in his landing net and held it up for me to see. "About five pounds," he announced proudly.

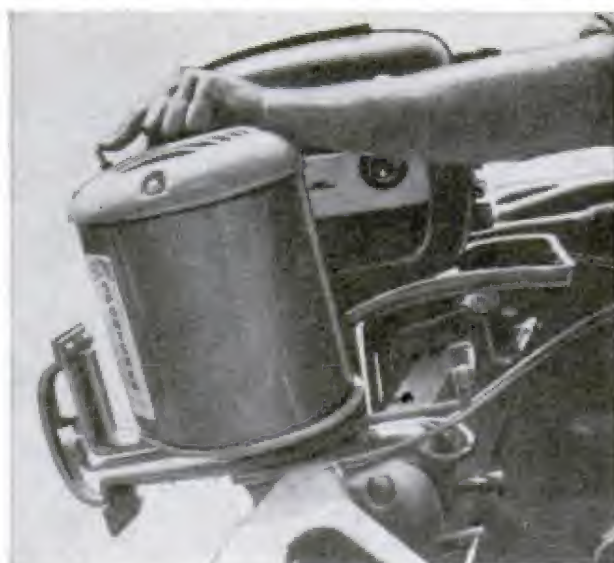
That was my introduction to the electric troll-motor in bass fishing; similar incidents since have sold me on their merits. I've reached the conclusion that such a motor is the wisest investment a dedicated bass angler can make. It takes much of the labor and guesswork out of fishing, and it definitely pays off with better catches.

As any seasoned fisherman will tell you one of the foremost requirements for successful bass angling is proper presentation of the bait. Haphazard fishing won't fill the stringer; to succeed with bass, the fisherman must pinpoint his casts into likely spots and fish the bait correctly. Most anglers work their lures too fast. In most cases, the slower the retrieve, the better your chances for a bragging-size fish.

Proper approach is also all-important. Bass are often spooked by unnatural vibrations in the water and a big bass may not strike a bait if it is forewarned by a hint of strange noise.

At one time the bass angler had four choices for handling his boat while fishing. The favorite was — and probably still is — to drift with the prevailing wind. That was fine when nature cooperated, but all too often there was no wind or it was from the wrong direction. The angler was at the mercy of the weather with no control over his fishing pattern.

GO OUT FAST . . . FLICK THE SWITCH . . .



Author Tinsley, in his favorite fishing rig, runs out across Granite Shoals Lake in Texas with his aluminum boat and a 12-horsepower motor. When he's reached his spot, it's a simple matter to kill the big motor, drop in the troller, and ease quietly along the shoreline, casting with one hand and operating the small motor with the other when necessary. The motor in these photos is an Electric Sportsman; shown at far right are three other available motors. Another, not shown here, is the Minn-Kota Electric Troller

Second, two anglers could fish from the same boat—one fished while the other paddled slowly. This worked wonderfully, except that each angler could fish only half the time. Also it is difficult to maneuver a boat steadily with a paddle without making some unnatural noises.

Third, the fisherman could run his outboard at its slowest speed and fish on the move. But outboards don't idle along slow enough to allow the deliberate fishing required for this drift-and-cast method.

Fourth, he could drop anchor at each respective spot and fish it thoroughly. This was foolish. Not only was there a lot of work involved, but the angler could cover much less water. You can't catch fish unless you find them first. Fishing a variety of waters is often the key to angling success, especially in strange water.

Today the angler has a fifth choice, the troll-motor. It eliminates most of the problems; the only drudgery is keeping an ordinary automobile battery charged and ready as a source of power.

The tiny electrical motor pushes a boat along slowly and quietly; the slight motion is the only hint that the motor is running at all. It operates at a convenient speed for bass fishing, and by sensible operation of the troll-motor, the angler can have com-

plete control of his fishing. When you approach a likely-looking spot you can switch off the motor and fish there as long as you like. Or you can reverse the motor (most have full-pivot shafts) and move back and forth, plugging every foot of available water. You can even fish into a stiff breeze and still control the boat, and a wind, unless it is of gale proportions, is no problem. The possibilities are unlimited.

Most of the troll-motors on the market at present—such as The Electric Sportsman, the Minn-Kota Electric Troller and the LeJay Elec-Troll—have power units modeled after conventional outboard motors. The motor is on top with a drive shaft down to the prop. The lone exception is the Silvertrol with the power unit submerged in a waterproof housing and connected directly to the prop to eliminate the extra weight of a drive shaft.

An electrical troll-motor serves a myriad of purposes in fishing. Some fishermen use them as power units for small one-man prams, others troll with them. Troll-motors are allowed on many lakes where gasoline-combustion engines are prohibited. But its biggest splurge in popularity has come as an auxiliary motor for bass fishing. It is especially popular on the large artificial impoundments of the South and Southwest.

FISH AT A SNAIL'S PACE



A veteran bass angler on the sprawling artificial reservoirs of my home state of Texas is usually equipped with a powerful outboard unit to take him to faraway fishing grounds and a small troll-motor to put into use once he starts fishing. The troll-motor isn't built to compete with the larger gasoline-powered outboards; its battery-operated motor has limited power. At its best, it is only another tool in the highly specialized bass fishing we know today.

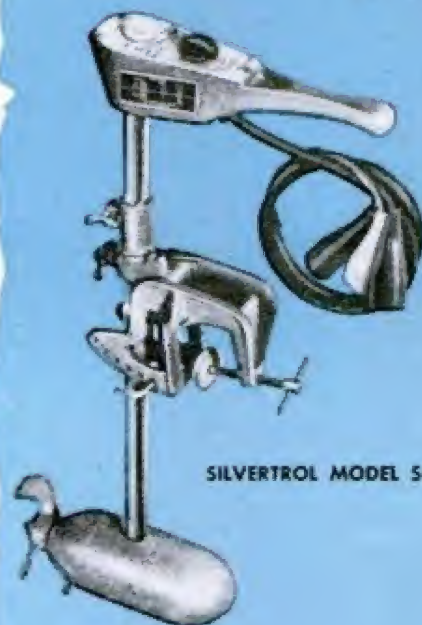
Most electric troll-motors operate with ordinary twelve-volt or six-volt automotive batteries, and a fully-charged battery is good for a hard day of fishing. When the angler comes in at night, he merely plugs a quick-charger into an electrical outlet, attaches wire clips to both posts of the battery and by the following morning he'll be in business again. Since many of the larger outboards now have electric starting units, the troll-motor can be operated off the same battery.

Many of the motors have two or more forward speeds. A complete outfit (motor, charger and battery) can be bought for between \$100 and \$175, depending on individual components. Troll motors are compact and lightweight; a woman can carry one easily. They range in weight from about twenty pounds to thirty-five pounds.

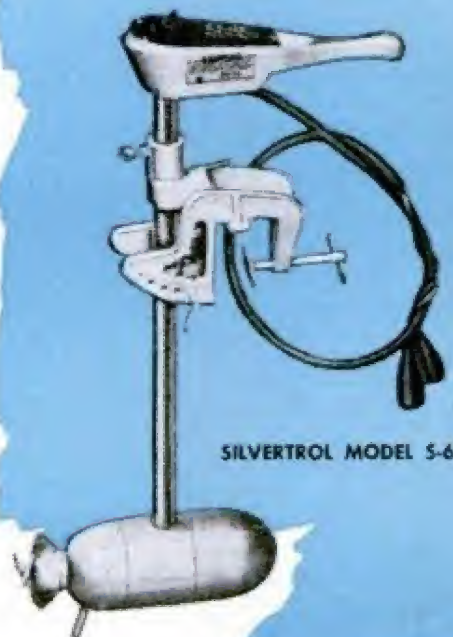
A troll-motor is very economical. Under normal use the automobile battery will have long life, and the electricity needed to recharge a battery is negligible.



LE-JAY ELEC-TROLL



SILVERTROL MODEL S-62



SILVERTROL MODEL S-60



Two tricks with electric motors—above, sit on the motor and steer with one foot. Below, mount the motor on the bow (note footrests). But don't try either without a good, stable boat



The secret of using the troll-motor successfully in bass fishing is being able to maneuver the boat, yet still have freedom for everyone aboard to fish. The Silvertrol has a wide, flat steering control, and many fishermen manipulate their crafts by simply steering the motor with one foot. The others have easily operated hand controls or optional remote steering.

Standing upright in a rocking boat with one foot on a motor is an awkward and precarious position. To steady himself, the angler can lean against the larger outboard, giving him a three-point stance. But even at that, he won't be as steady nor as confident as he would with both feet on the boat floor. Best wear a life preserver since the slightest jar can topple the angler overboard. I've seen it happen numerous times when the boat would strike a submerged limb or rock.

With other motors, the angler can steer by situating himself where he can readily reach the steering control with his left hand (or right hand if he is a southpaw). By merely touching the control between casts he will have complete control.

Most troll motors are mounted on the transom alongside the outboard, but some anglers bracket them on the bows of their boats. Others even place the motors amidships. I saw one fishing boat equipped with troll-motors both at the stern and bow, and two operators could move the craft slowly along with it at right angles to the shore. Thus both anglers could fish forward in the best waters rather than one having to cast his bait behind the boat in areas where his companion's lure already had run.

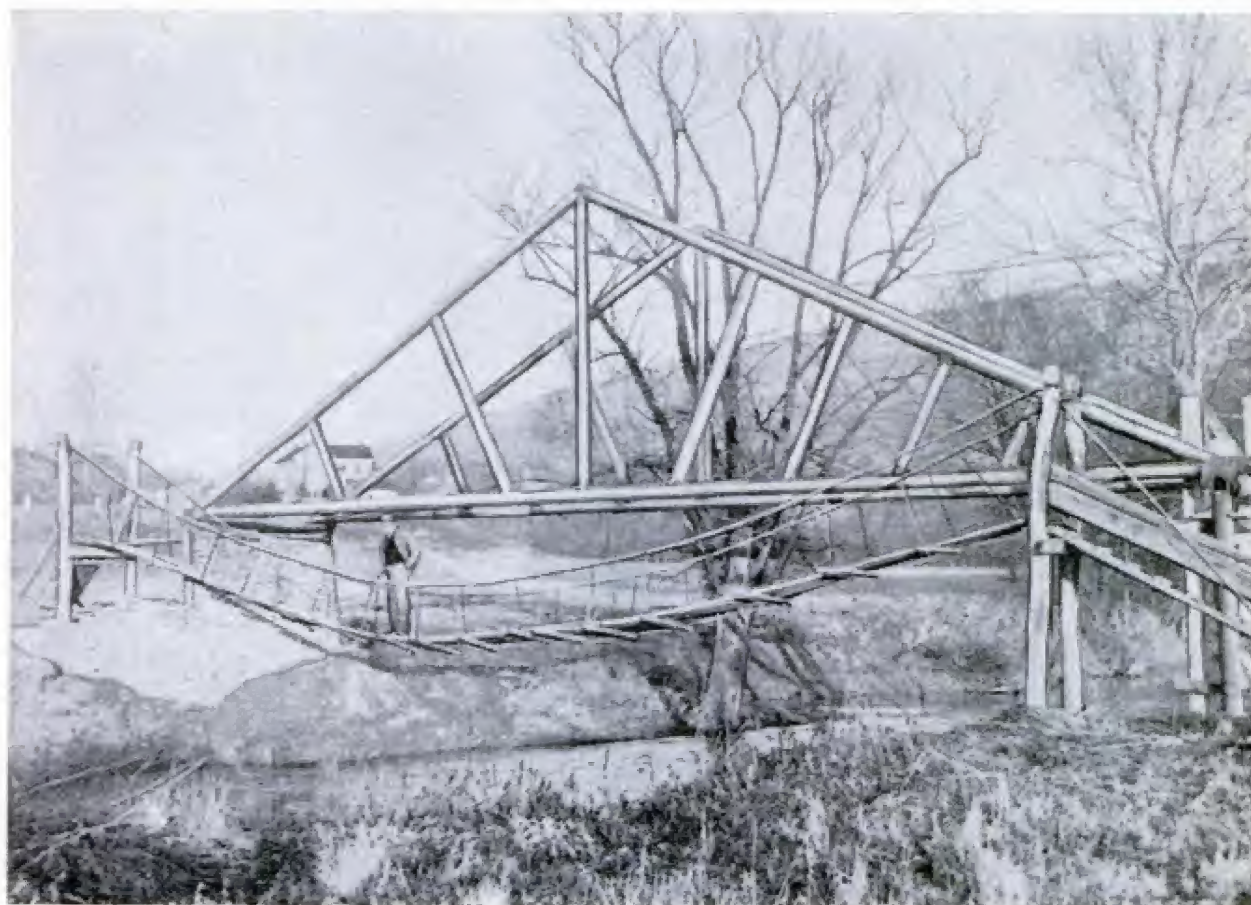
Last year, when I visited Bull Shoals and Norfolk lakes, man-made reservoirs on the Arkansas-Missouri border, I was amazed at the number of boats equipped with small troll-motors. All the professional fishing guides use them. A guide, always before occupied with fighting a paddle to keep the boat in position, now has the time to offer other services to his clients. One told me that the troll-motor was the greatest single advance in bass fishing since the artificial lure was invented. I think so, too. ★ ★ ★



Farmer Builds Bridge of Gas Pipe

FOR YEARS, Lawrence W. Crouse of Greene County, Pa., carried 10-gallon milk cans across a swinging footbridge between his farm and the highway. And each year, during high-water periods, he had to ford the creek to reach the road. Now he has a

brand new bridge, built to his own design, although he has had no engineering training. He built the 140-foot trestle from eight-inch and three-inch natural-gas transmission pipe. The roadway is a wooden deck bolted to the pipe.





Wrist Life Preserver

Necessity is billed as the mother of invention, but a nightmare was the inspiration for this one. Marine Gunnery Sgt. Daniel O. Davis, of Camp Lejeune, N. C., dreamed he was drowning but was saved by a floating wrist watch. He decided later that a wrist-worn life preserver was a good idea, and is planning manufacture of the small cartridge-filled model shown here. A small button actuates the cartridge; the preserver is reusable.



Dali's Ovocipede

Looking like something dreamed up by Salvador Dali (it was), the ovocipede is a transparent plastic sphere that is propelled by the occupant, who runs along on the inside track like a squirrel in an old-fashioned squirrel wheel. The famous painter claims that the "vehicle" can be rolled over land, water, ice, or snow—the operator stands and holds the two hand bars on the axis, or can sit on the seat to coast. Steering is managed by shifting the weight along the axis in the direction of the turn. The driver turns around to reverse.



Suction Cup Holds Dog

For those who like to shop while taking their dog for a walk, a London girl had an idea. She fixed a rubber suction cup to the end of the dog's lead that can be attached quickly to any plate glass window. To leave the dog safely tied outside a shop, she merely pushes the suction cup on the shop window. The cup has been found to hold firmly in spite of persistent tugging over periods of an hour or more. Yet it can be removed easily by lifting the edge with a fingernail.

❏ Similar rock samples found in Antarctica and Tasmania by a New Zealand research team indicate that Australia and Antarctica were once joined.

❏ First of its kind in Europe, a new pulp mill in Corbehem, France, makes possible the use of hardwoods to produce newsprint.

ONE-MAN HOUSE

COMBINING the compact convenience of an apartment with the privacy of a free-standing house, this neat 16 by 26-foot "bachelor" townhouse was designed by the architects in Holland's Rotterdam Stichting Bouwcentrum (Building Center) to meet the demand for comfortable quarters for tenants who want to live alone but don't like the towering downtown apartment buildings.

Packing all the components of an independent home into 400 square feet can't have been easy, but the designer did it by eliminating the bedroom (as such) and using built-ins to keep furniture at a minimum. There's outdoor living, too—with a broad veranda outside the utility-entry section and a balcony opening off the living-dining-sleeping room at the other end. Two glass doors open onto the balcony, and one forms a wind-screen against the open side. The other side is screened by an extended wall.

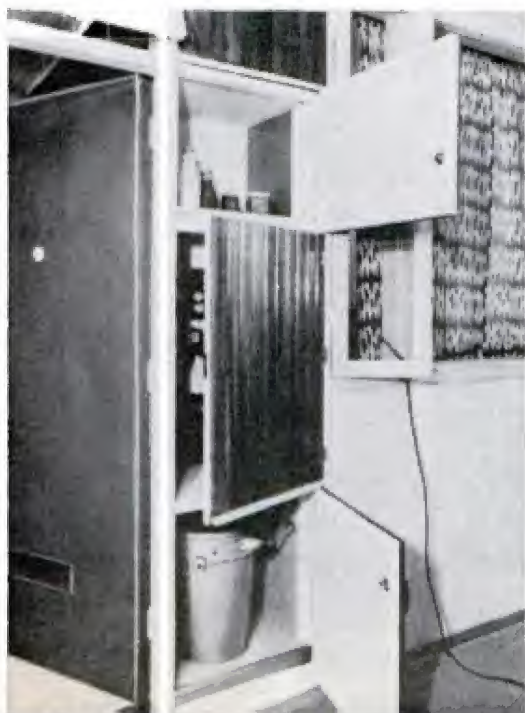
Inside, wardrobe storage is built into the entry wall; kitchen storage is in built-in cabinets; more storage is at the foot of the bed and along the storage wall in the living room, which also doubles as a desk.

Cleaning equipment, utility meters, and pass-through delivery port adjoin entry



Traditional Dutch enclosed bed, at right rear, doubles as an extra couch in daytime or can be closed off with draperies

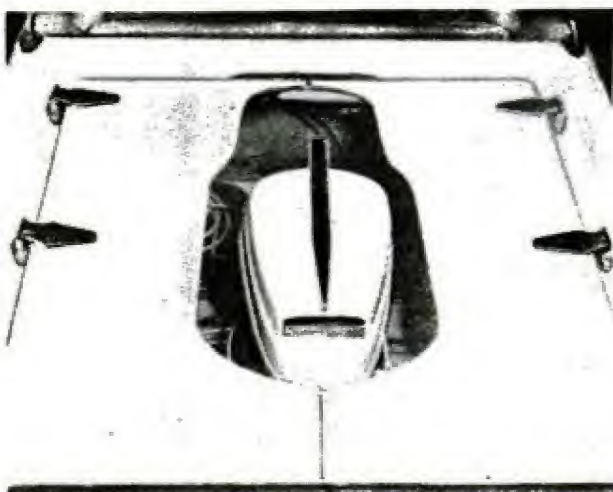
Adjustable living-room storage wall is also an office and an entertainment center with portable TV and rollout phonograph





Inboard-Outboard Runabout

Dissatisfied with commercial outboard motorboats, Joseph Bryan of St. Joseph, Mo., worked for two and a half years to design and build his own runabout, and finished last summer with this trim 18-footer which boasts several features new to outboards. Most apparent is the enclosed outboard motor, which is readily accessible through the cutout, but baffled until it's almost silent. Other features are auto-type lights; full convertible top, seats that shift fore and aft, and a radically different trailer on which the boat can be turned around and launched bow first. The engine hood also covers fuel, battery, and flotation.



Bow Turns Flame Thrower for Oilmen

Waste gas fumes burning off from this flare tower at Nevis, Alberta, sometimes blow out, and the mechanical relighting device doesn't always work. The oilmen keep a bow and a fire arrow handy and relight the flare by shooting a flame through the fumes. It doesn't require any skill at archery—note this oiler's unusual form.



Rush-Hour Reading Glasses

Rush-hour crowds packed John Holding into the London subway too tightly to read his paper. In desperation, he bought a pair of right-angle-vision glasses, the type used for reading in bed by invalids who can't sit up, and reversed the prisms so the glasses viewed straight upwards. Now he rides and reads in the densest crowds.





Inflated Plastic Domes Shelter Winter Builders

Three Minneapolis home-building crews work during winter months under sun-warmed domes of air-supported, transparent polyester plastic. When the sun doesn't shine, the 40 by 70-foot domes are heated with auxiliary units. The builder expects the technique to allow him to erect 60 more homes than the Minnesota winter conditions normally would allow.



Truck Cab Serves as Bus Stop

Rural youngsters at Okawville, Ill., won't have to wait for the school bus in the cold any more. An old discarded truck cab, put on skids and placed near the highway, makes waiting fun. The seat accommodates four, and with good glass in the cab, the most blustery wait is no problem.



Replacement Carbs for Imports

Carburetors on four foreign cars now can be replaced easily if necessary with a special carburetor package. Replacement is made by a "take-off, put-on" procedure. The carbs, designed by Carter Carburetor, fit Volkswagens, Hillmans and the Anglia and Prefect models of English Ford.





FOR THE MILLIONS who soon will be permeating the air with the odor of sizzling steaks cooked over open charcoal fires, *POPULAR MECHANICS* presents its 5th annual outdoor living section — 21 pages packed with unusual suggestions to help you better enjoy living outdoors

Permanent Additions to Improve Outdoor Living

OUTDOOR LIVING has outgrown its swaddling clothes and is no longer a way of American life to be satisfied by improvisation, makeshifts or portability. Most home owners are seeking permanency in the equipment and structures used in outdoor living, and prospective home buyers are influenced favorably by the means provided for this type of living. Therefore, careful thought should be given to design and permanency of equipment.

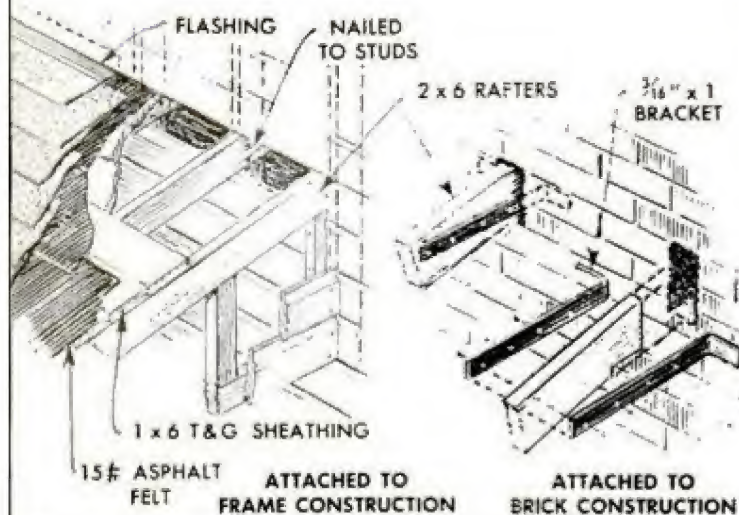
SHELTERED PATIOS

FOR THE COST, a patio attached to your home will add more to the value and do more toward your enjoyment of living outdoors than anything. It will provide a comfortable spot on hot days, protection against showers, and can be screened against insects, or glazed for cool days.

While actual construction of a roofed patio is relatively simple, it is not a matter of building a porch onto your home. It must be designed and located to blend with the architecture of the home. On this and the following two pages several designs of patios are shown. Notice how they blend with the architecture of the houses to which they are attached. Therefore, when planning your patio be sure its design is suitable for your particular home. Step back a couple of hundred feet from the house and try to visualize the appearance of the patio you plan. Will it complement your home, or will it detract from the appearance? A poorly integrated addition can actually decrease the value, whereas a suitable addition often will add much more than its cost to the value of a home.

Notice in the sketches on these pages how the architect has made the patios compliment the buildings and become part of them. In the sketch of the Cape Cod house above, running the patio roof around the end of the house does the trick. Had the roof stopped at the eaves, the appearance would not have been so effective.

Simple shed-roof patios such as shown at the left, will be enhanced by adding an arch fascia and matching the siding to that of the existing house. The details show how to frame the roof into the side of the house for either brick or frame construction.

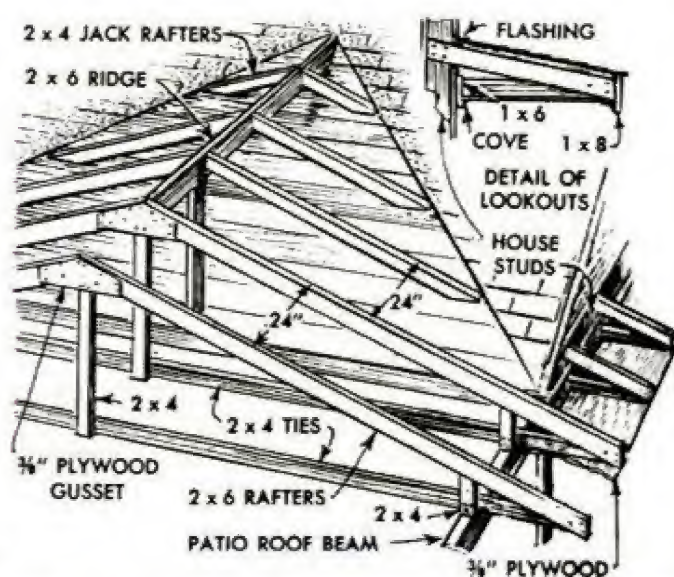
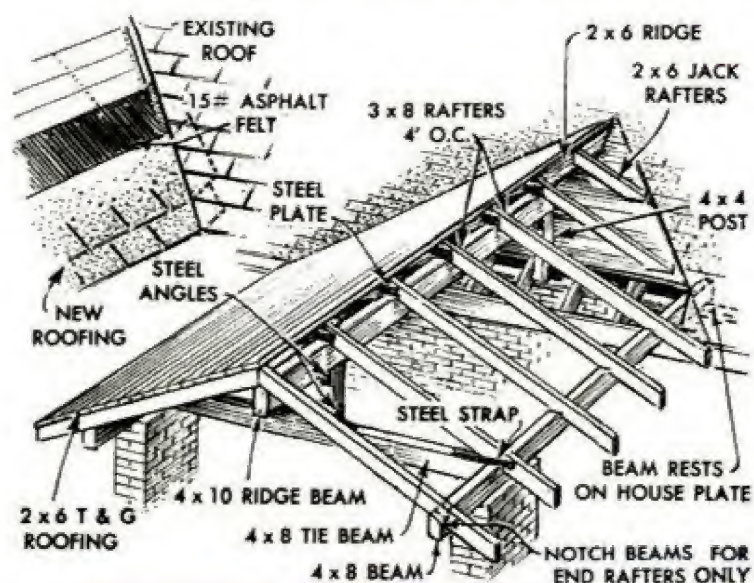




A gable patio roof with open end and exposed rafters, such as the one above, will blend with almost any house having a gable roof. Such a patio will give a decidedly modern flair to your home. Use large brick columns for a brick home, and large framed columns covered with siding

for a home of frame construction. Details below left show roof construction.

In the lower right sketch notice how the lines of the gable-end patio roof are carried across the end of the house. This treatment avoids the appearance of a lean-to type of addition and helps blend the patio roof into

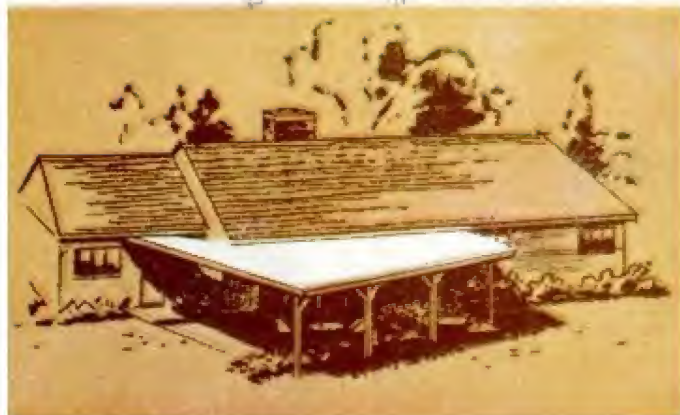
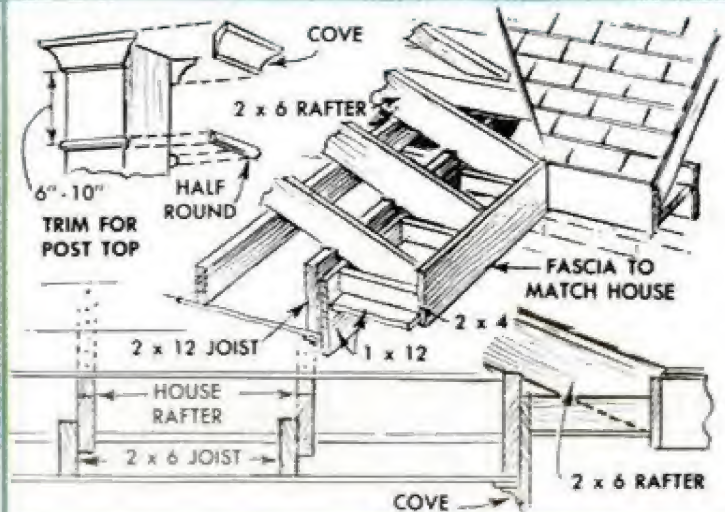
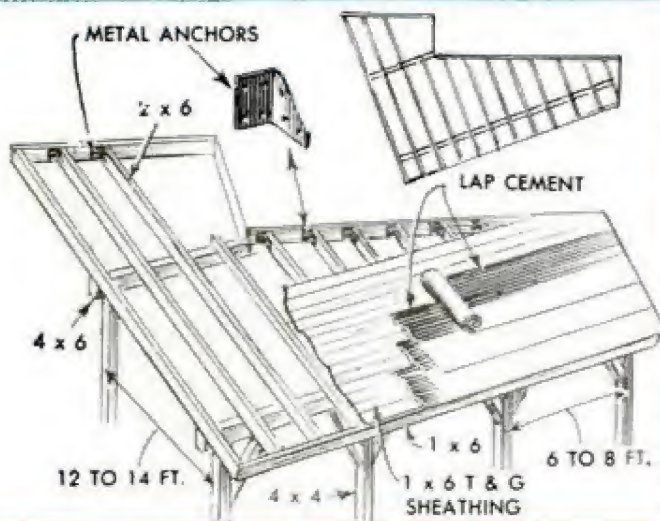


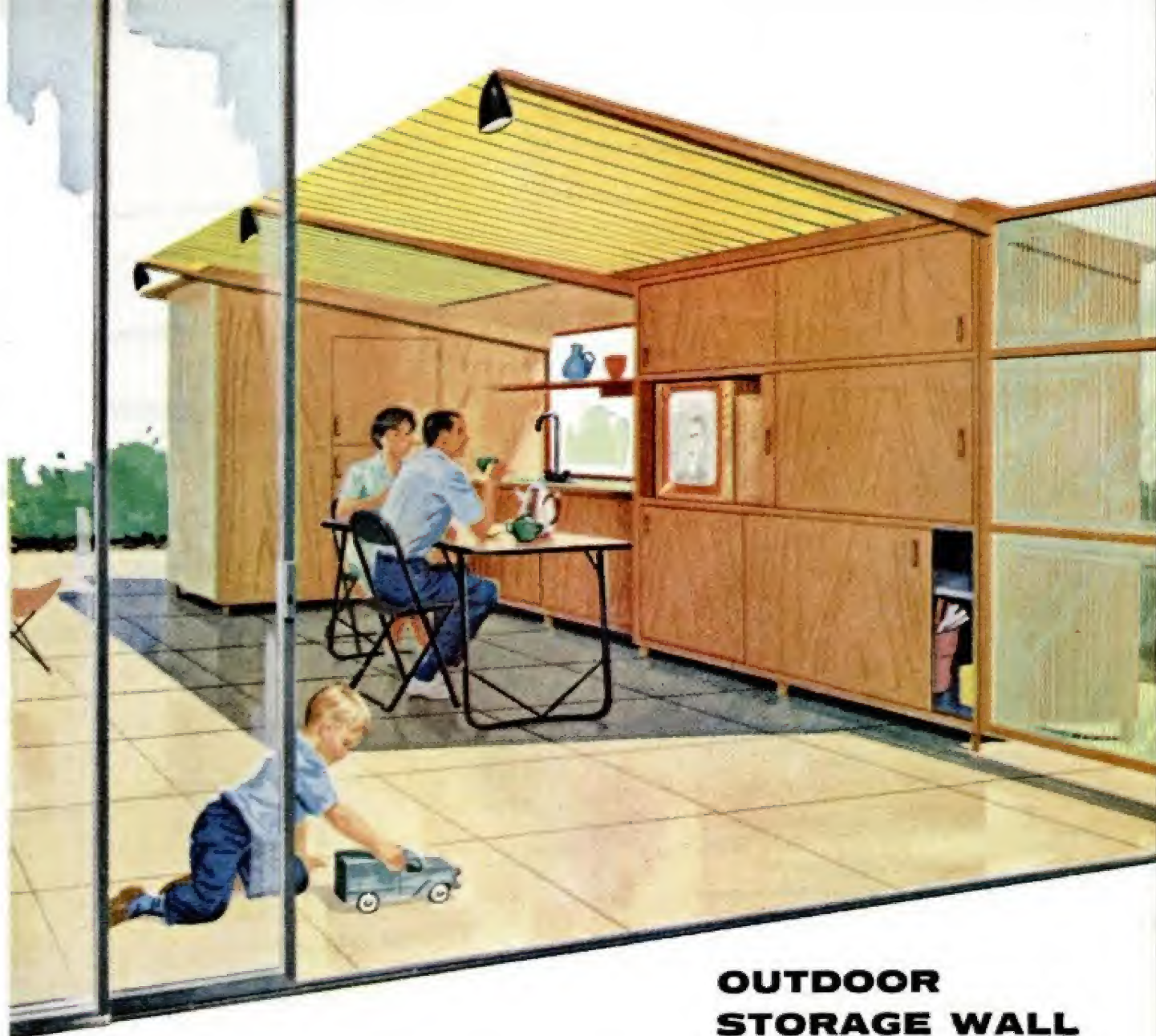


a house of this shape. Notice in the details how lookouts are constructed to support the roof along the end of the building.

For a ranch-house patio where a matching roof is not practical, build a flat roof that compliments the building by performing some extra functional task, such as cov-

ering a walk as shown above and the lower left-hand detail. A Georgian home with its formal appearance suggests two solutions; stately columns with a roof matching that of the house, below right, or a flat roof. If a flat roof is used, add a roof-top railing to complete the picture.





OUTDOOR STORAGE WALL

WHERE A HOUSE or yard doesn't lend itself too well to an attached patio, a free-standing one in the form of a "living wall" may be the answer to your outdoor way of life. A veritable oasis in your back yard, this outdoor storage wall contains everything—including the kitchen sink.

For your cookouts, it provides an attractive and sheltered barbecue center, complete with cooking and dishwashing facilities. As an entertainment center, it houses a portable TV and hi-fi unit for your loafing pleasure. It has a place to keep

outdoor game equipment, all within easy reach. It contains ample storage for your garden truck, everything from potting supplies to the power mower. And the beauty about the whole thing is that when you are through entertaining or loafing family-style, the mess can be chucked away right on the spot with little or no effort. There is even a cubby-hole for a folding table and chair set to save carting it inside.

Whatever the shape of your yard, this adaptable wall will fit in because it is composed of three separate sections, A, B and C, which can be arranged and nested to-

A



B



C





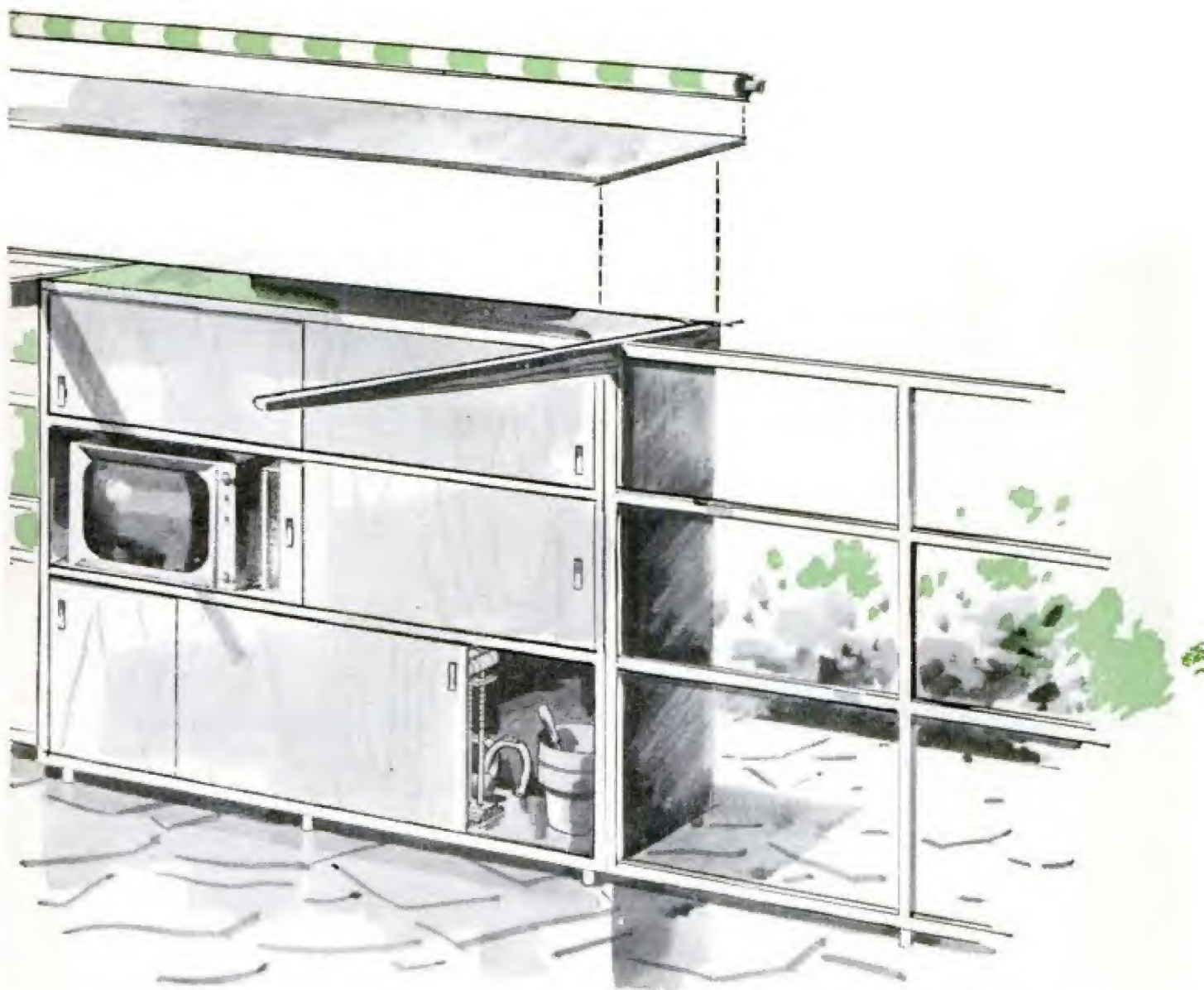
gether as desired. For a limited budget this year, one section could be built now, the others later. All three, with one or two of the 8-ft. screen sections shown, will give you a luxurious outdoor room.

Section A is the entertainment center. Its six sliding doors on the front side open into deep cabinets for games, the TV, etc. Its 8-ft. width allows good acoustics for the two speakers of a portable stereo set kept inside the cabinet. In back, two large hinged doors open to other shelves—generous storage for garden and lawn supplies, paints, etc. Section B is basically a kitchen-

sink cabinet designed for outdoor usage. You can store a large folding barbecue table and its chairs inside this open cabinet. Its back is a screen matching the other screen sections. Section C gives a dish cabinet above and another below on the front side for storing a movable charcoal grill. On the rear side it stores your bulky garden tools—lawnmower, rakes, shovels, etc. There, at the middle, it also has a compact work counter and shelves for small garden tools.

All three sections are roofed with flat asbestos-cement board, a simple and per-



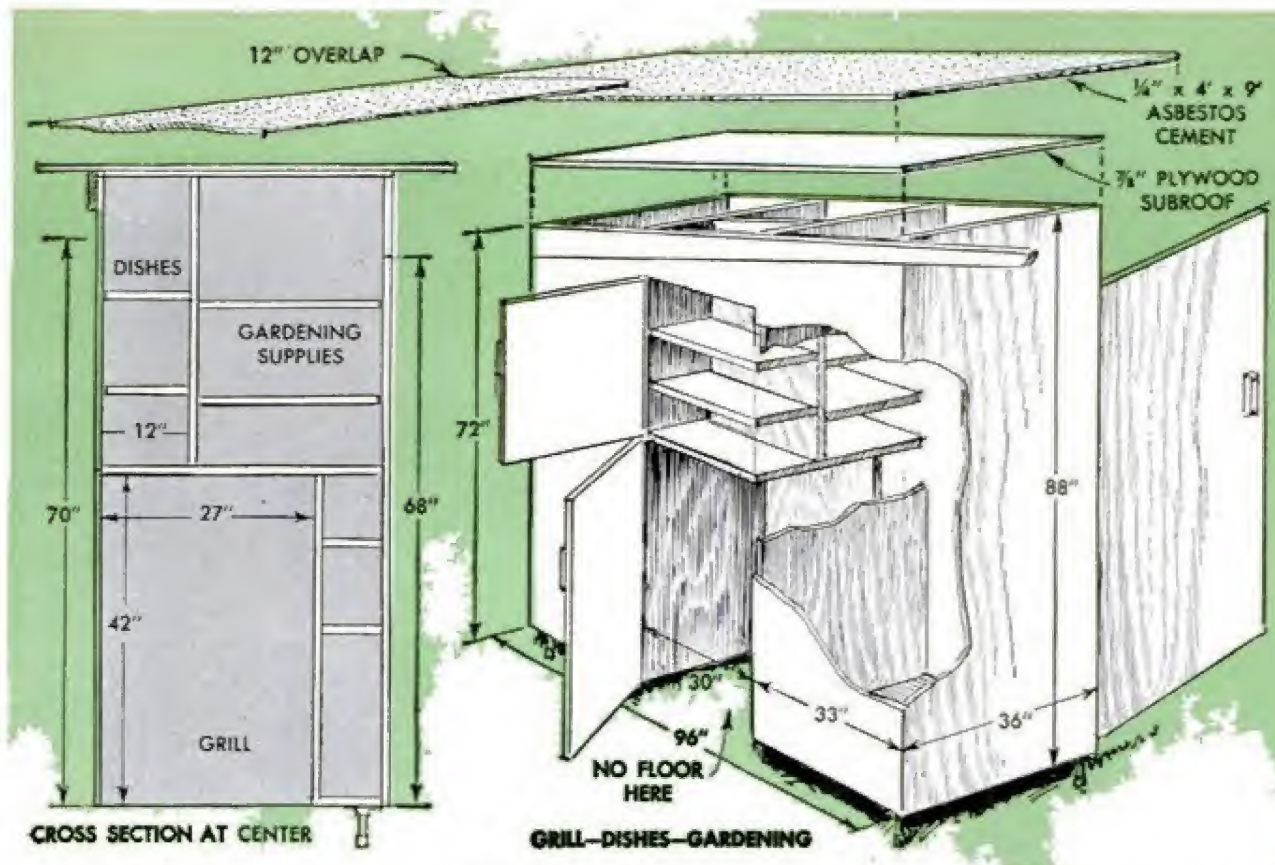


manent roofing for the design. To shelter the dining-entertainment area from sun or rain, any lightweight patio roofing material can be laid over the tapered roof beams—canvas, glass-fiber panels, lath, reed fencing or the like. A roll-up canvas canopy is another possibility. It gives you adjustable shade overhead and can roll back on the roofs of A and B sections when not needed. If you are using glass fiber, the roofs of the three sections can be of the same

material. The three sections, and any matching screen sections, rest on short pipe legs to be above wet and snow. Thus, they also can be placed over anything from bare earth to a concrete slab. The 5-in. height is enough to allow using a hose or push broom underneath.

Cabinets as shown are built of $\frac{3}{4}$ -in. fir exterior plywood — the floor, sides, partitions, shelves, hinged doors. This gives the easiest construction as no framing is re-



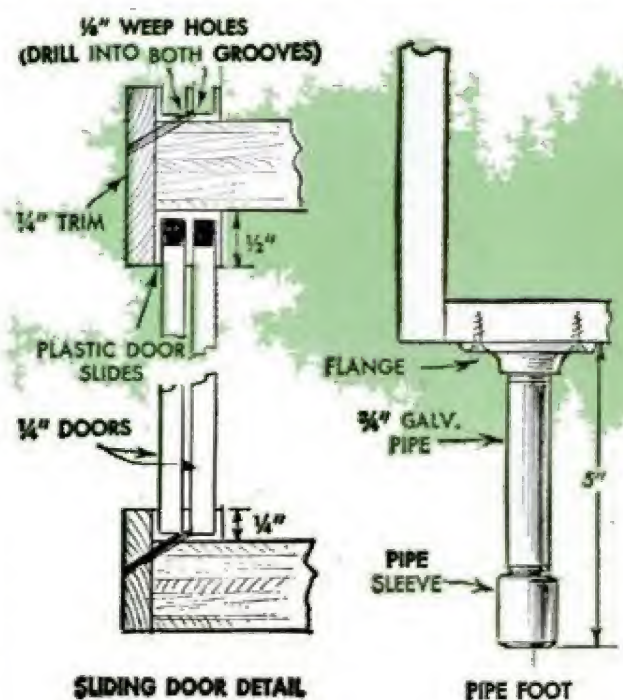


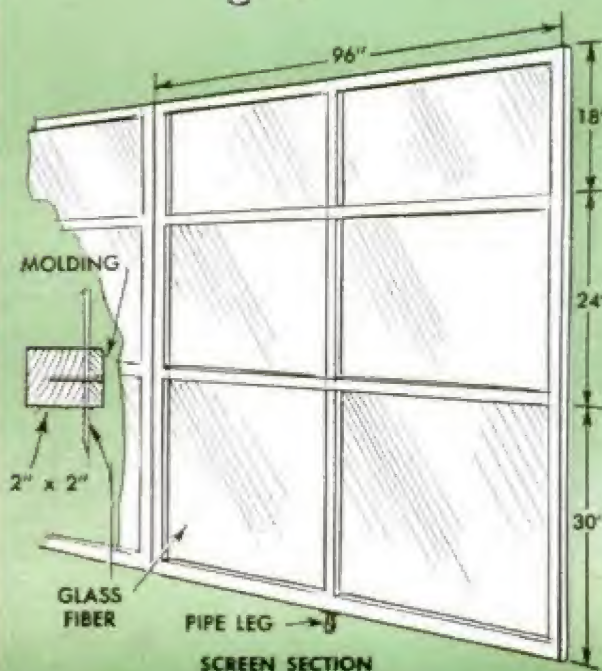
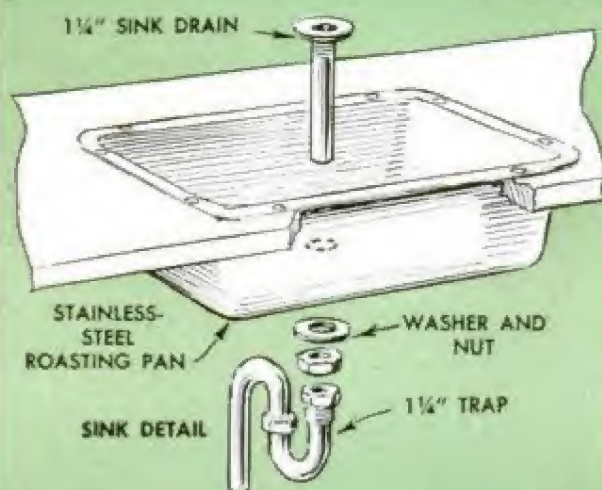
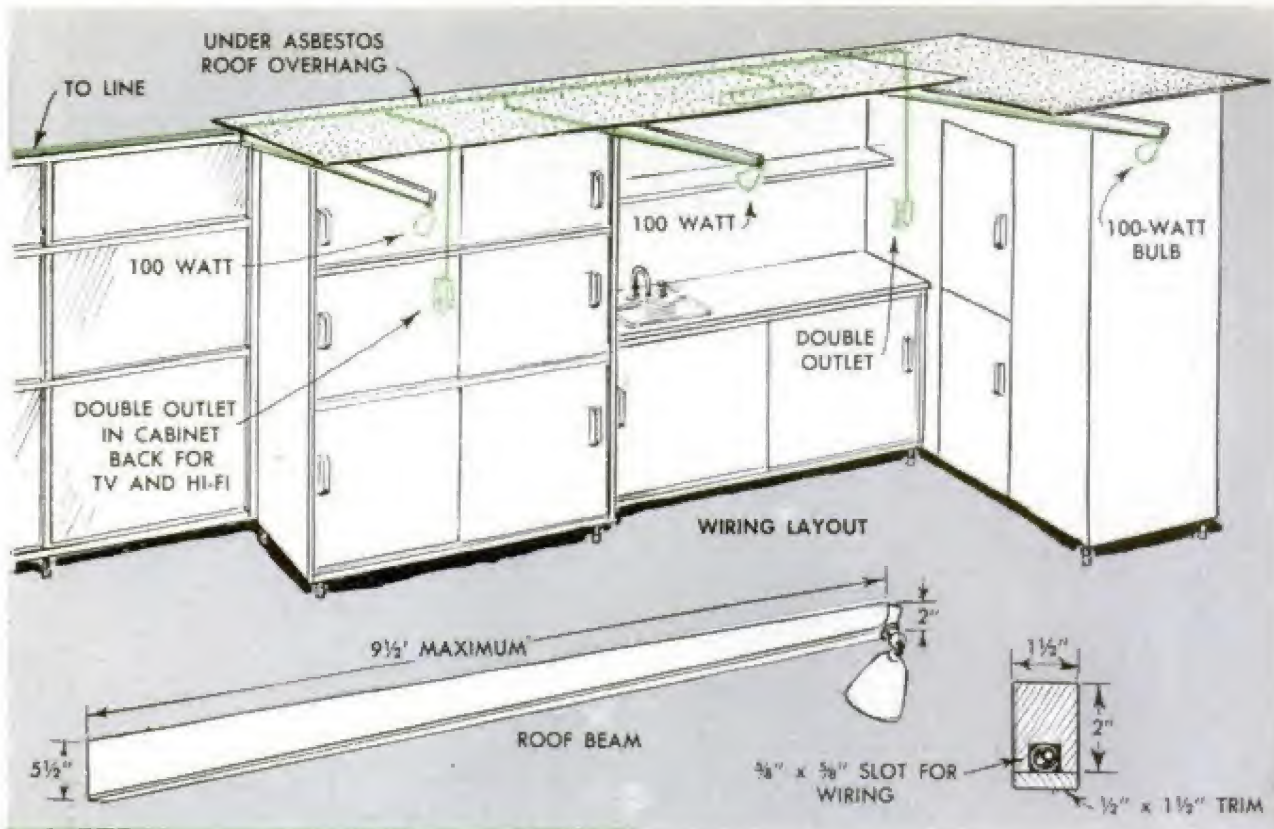
wrench. On rougher or softer floors, set longer pipes in concrete in the ground with their tops leveled. Section B needs only two legs at the middle, since it is supported at its ends by screws into A and C.

The details show a simple way to weatherproof the sliding doors of A and B. Set the lower plastic slide in mastic and, after installing the trim, drill an $\frac{1}{8}$ -in. weep hole every 12-in. along its length to drain off rainwater. The doors can be $\frac{1}{4}$ -in. plywood or hardboard; a pair should lap each other at least 4 in. Hinged doors of $\frac{3}{4}$ -in. plywood are used elsewhere. Those on the rear side of the wall can be 3 to $3\frac{1}{2}$ -ft. wide; at least three hinges should support each. Paint all doors, hinged and sliding, on both sides to prevent warping.

Sections A and C have $\frac{3}{8}$ -in. plywood sub-roofs or roof sheathing. When the cabinets are permanently in place, a 4x9-ft. panel of asbestos-cement board is laid over each section, giving a one-piece roof with a 6-in. overhang on all sides. A third 4x9-ft. panel of the asbestos-cement board is laid over section B. Supported lengthwise by the screen frame and the 2x4 front beam, it overlaps the other roofs 12 in. at each end. Use seam compound where the panels lap. Secure the asbestos-cement board with large-head roofing nails using only about eight through each panel, and placing a spot of seam compound under each nail when driving it down. When all three cabinets are to be placed in a straight row, build the roof of C the same as that of A.

A roasting pan (or large round mixing bowl) of stainless steel will inexpensively give you a durable bar-type sink for section B. Choose a pan with fairly wide rim and place mastic underneath when screwing it down to the countertop. Finish the countertop first with laminated plastic or vinyl linoleum. Only a cold-water faucet is shown. Running a hot-water supply from the house is optional but usually more of a complication than an asset. The high-





necked faucet shown makes the sink handy for watering potted plants.

You can tap the cold-water supply from any convenient outdoor faucet, using pipe, plastic pipe or heavy hose, as your individual layout demands. Provide for draining the line in freezing weather. The waste line will also vary individually — from a hose leading to a rock-filled sump to a 1½-in. soil pipe leading to the sewage line. Definitely include the sink trap if connected to the house sewer.

Your electrical wiring also varies. First, check your building code for local requirements. A layout similar to the one shown in the drawings will give good lighting overall and also outlets at the counter and for the TV and hi-fi. The three bullet lights can be switched separately or be all on one switch. This is a grounded 20-amp. circuit from the house, using No. 12 wire. It can be two wires in conduit or two, plus a grounding wire, in plastic cable, depending on code. Note how wiring to the bullet lights can be hidden in the tapered roof beams. However, when you arrange the living-wall sections, tend to run all wiring from above, the plumbing from underneath.

The screened section to extend the living wall out from the house is easily framed of 2x2s as shown in the drawings. Clear or colored flat glass fiber gives it permanent translucent panels. Plastic-coated fly screen gives a budget-wise substitute which will last two to four years. ★ ★ ★

PATIO AND BARBECUE EQUIPMENT



DESIGNED FOR your cookout dining pleasure, here is an attractive combination barbecue and outdoor fireplace, a unique table that "serves you," and other furniture pieces and equipment that are inexpensive and easy to make. Construction of each piece is shown in the drawings on the next two pages. The combination fireplace is laid up of bricks on a concrete foundation to the dimensions given in Fig. 7. The grill has no smoke opening into the fireplace flue since most barbecuing is done over charcoal.

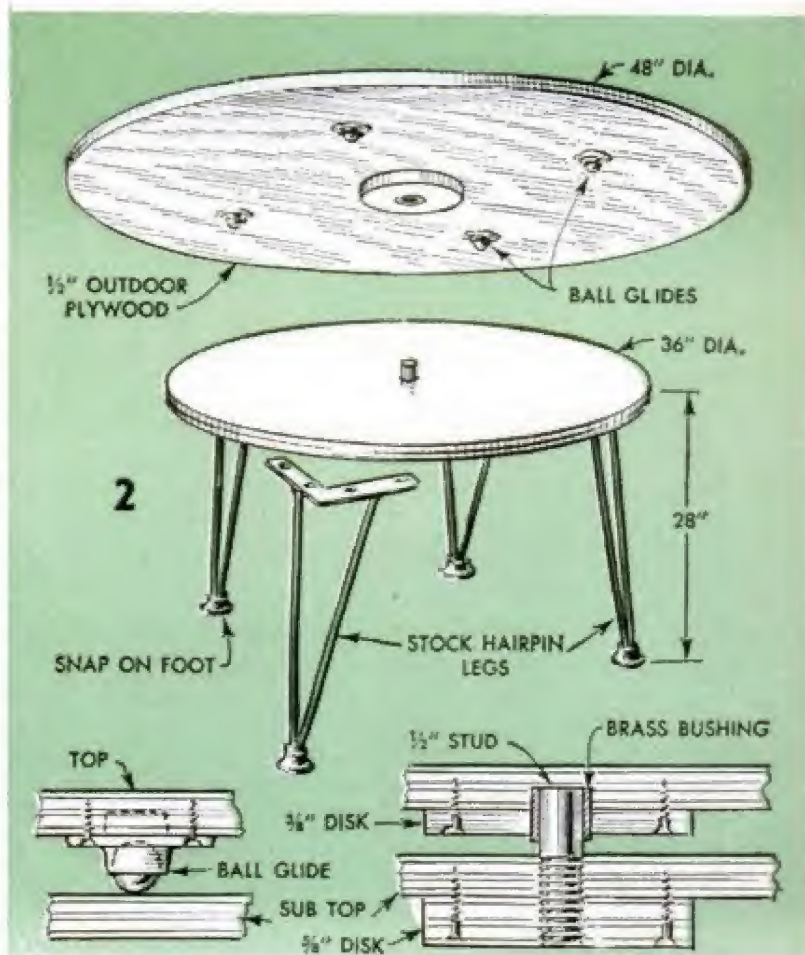
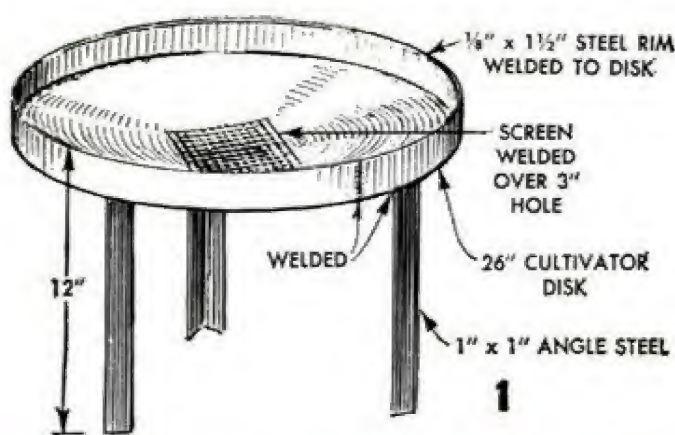
An overgrown lazy susan, the table detailed in Fig. 2, is ideal for self-service barbecue dining. The rotating top permits guests to select food from any dish desired without having to file around the table.

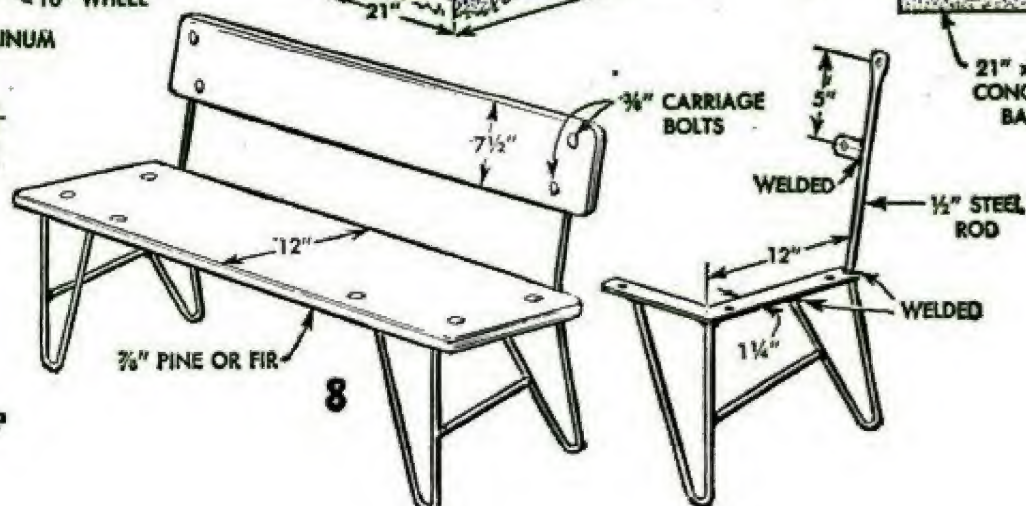
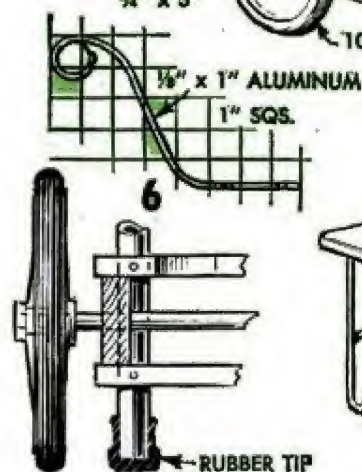
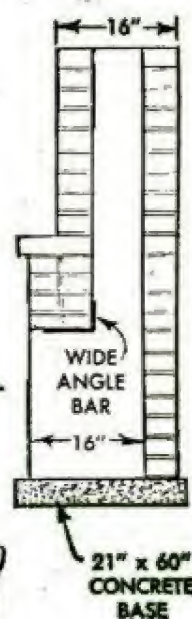
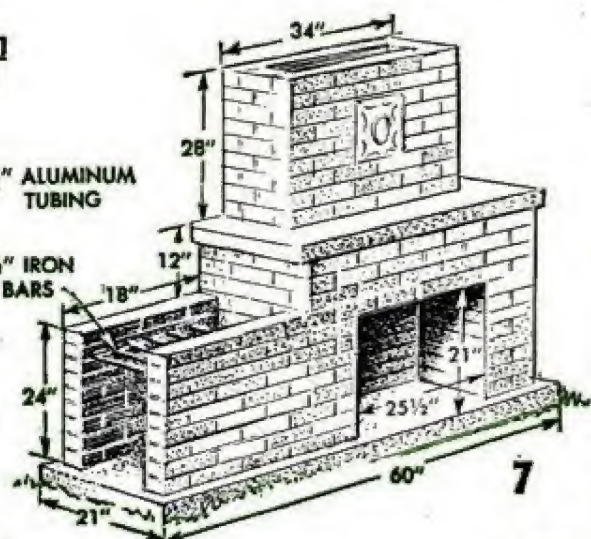
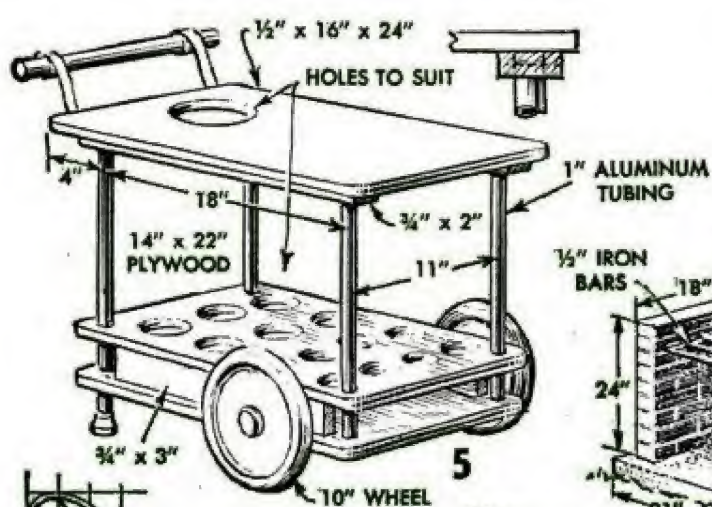
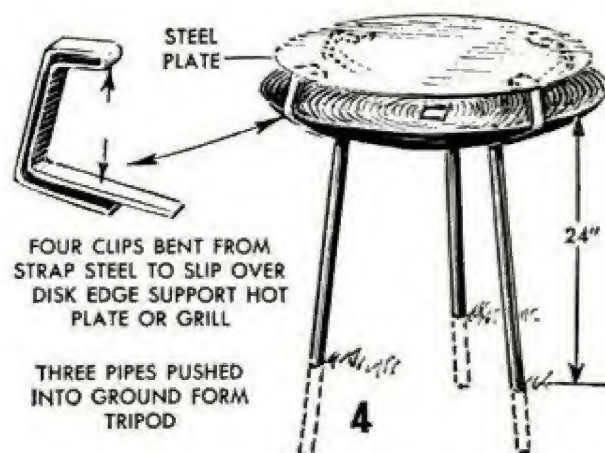
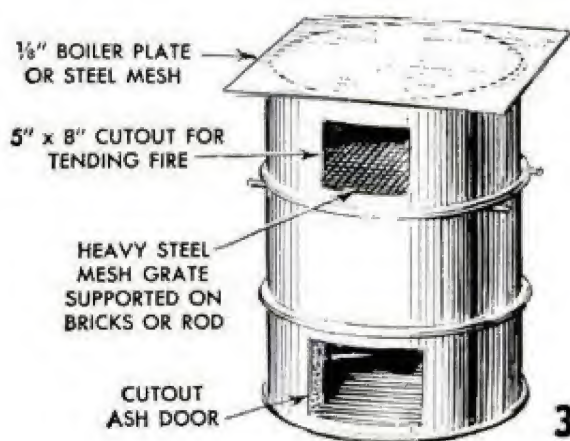
This arrangement is especially convenient when all guests can be seated within reach of the table. Built of $\frac{1}{2}$ -in. exterior plywood, the table has a 48-in.-dia. top that rotates on a 36-in.-dia. sub top mounted on hairpin legs. The rotating feature is provided by a stud that serves as a shaft and four ball-type glides or casters installed as detailed in Fig. 2. The plywood disk that takes the smooth end of the stud (cut from a $\frac{1}{2}$ -in. bolt), is glued and screwed to the underside of the table top; the other disk is fastened to the underside of the sub top in the same manner. Both disks are 3 in. in diameter. The threaded end of the stud is turned into an undersize hole drilled through the sub top and disk as shown in the sectional detail. Note that a brass bush-

A companion bench for the table is detailed in Fig. 8. After the leg-and-back support assemblies are welded from 1/2-in.-steel rod and 1/8 x 1 1/4-in. flat steel, the seat and back are cut to size from pine or fir lumber and bolted to the supports as shown.

For those whose outdoor living consists of only an occasional cook-out, the grill shown in Fig. 1 is about the least expensive you can make to serve the purpose. It consists of a large cultivator disk having a steel rim welded around the edge, and a piece of hardware cloth welded to it over a hole in the center. A portable grill that is somewhat similar and about as inexpensive, is shown in Fig. 4. This one utilizes a large disk but has a steel-plate grill supported above the fire by removable brackets. The legs are not welded to the disk. Instead, they are merely driven into the ground so as to support the disk tripod fashion. This type of assembly permits the entire unit to be dismantled and stored in a small space. Where efficiency and low cost are more important than appearance, it is hard to beat the oil-drum barbecue detailed in Fig. 3.

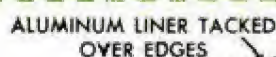
Highly functional and easy to move about on rough surfaces, the service cart detailed in Fig. 5, will be one of the most popular items of your patio accessories. It can be used as a beverage-and-food dispenser, as well as for carting food and dishes from house to patio and return, saving many steps for host and hostess. The top, bottom and glassware shelf are $\frac{1}{2}$ -in. exterior plywood cut 16 x 24 in. for the top and 14 x 22 in. for bottom and shelf. All glassware holes are the same size, except for the row at the back of the shelf, which are cut large enough to take 1-qt. beverage bottles. The hole in the top may be cut to take a plastic ice bucket or a serving dish, as desired. All wooden and metal parts of the furniture and equipment should be given protective coatings of paint or varnish. Liquid preservative should be applied to the wood parts first. ★ ★ ★







ONE CAN USE outdoor planters to key the planning of nearly all outdoor-living areas. As an example, note how the replica above, Fig 1, not only is a decorative planter in itself, but also is, architecturally, a part of the house. Materials and finish have been selected to achieve this end. The covered well is made of used brick and is covered by a shale roof. Framing is of 3 x 3-in.



- 1/2" DRAIN TUBES

5. This planter is made of cypress which properly finished will well stand dampness and inclement weather. If made of pine, planters such as this should be lined with sheet metal or with tar



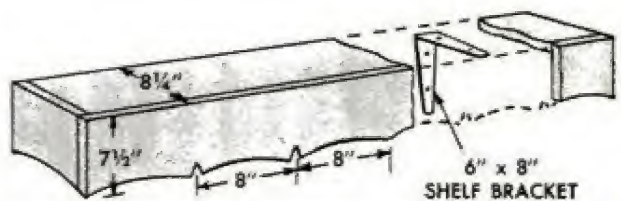
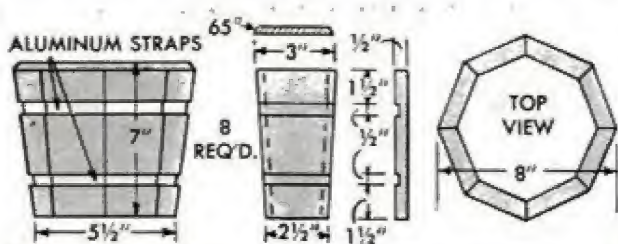


Flanking the entrance walk, planters such as this one add color and atmosphere to the house and grounds

redwood uprights secured with bolts and set below grade to a depth of about 1 ft. For strength, the unit is erected on a 4-in. concrete slab with the brickwork laid in after the uprights are installed.

The number of designs used to make outdoor planters is limited only by the imagination and resources available to the de-

signer. The size and shape of the lawn or garden area will, of course, largely determine the limits of what can be done. But once the practical possibilities have been assessed, imagination may be given free rein. If planters are used to divide an area, for example, the beginning of a geometrical motif is set, and a judicious use of smaller





Cut flagstone has the advantage of being both pleasing to the eye and easy to manage in construction. This planter is made of layers of flagstone and has a grillwork of iron pipes supporting a wooden roof

planters, flower beds and shrubbery, Figs. 7 and 9, may be used to further develop it. The use of wood and stone in a rather large planter may set the accent which the rest of the ground design repeats and develops. The use of plants also offers many possibilities. For instance, climbing vines and flowers in a central planter which has a trellis may be set midway between the house and the fence or walk. This may then be repeated in shallow planters bordering the area and by ivy climbing the house itself. Stone planters extending perpendicularly from the house midway into the lawn

Wagon wheels add a picturesque quality to any lawn. This one was set in a shallow planter and is backed by a pedestal topped by a lamp. The planter is open at the bottom for drainage of the lush English ivy



Here, blocks of limestone were used to enclose a flower bed near the entrance of the house. Level with the surface of the porch, the planter becomes, in effect, an extension of the house itself

area, as in Fig. 3, match the masonry construction of the house walls, which may again be repeated in stone-bordered flower beds flanking the house on two sides and along the front. The planter shown above is a good example of the rugged beauty of stone and of the use to which it can be put. It is made of cliff stones of various sizes and the spreading rock plants will eventually cover it. The contrast of leaf and stone will only serve to enhance its beauty. If desired, such planters may be made to extend the entire width of a lawn and thus serve as rustic stone fences. The

Almost austere in its formality, this stone planter is set with a sword palm near the entrance of the house. Several of these placed on a concrete patio or veranda add an air of dignity to their surroundings





Homeowners in the dry Southwest will appreciate the decorative grace of these sand-filled cactus planters. They are made of cultivator disks welded to pipe flanges and set on pipes driven into the ground

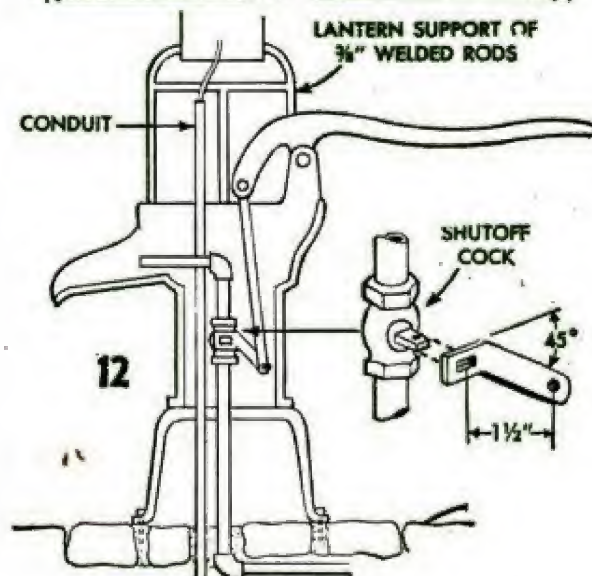
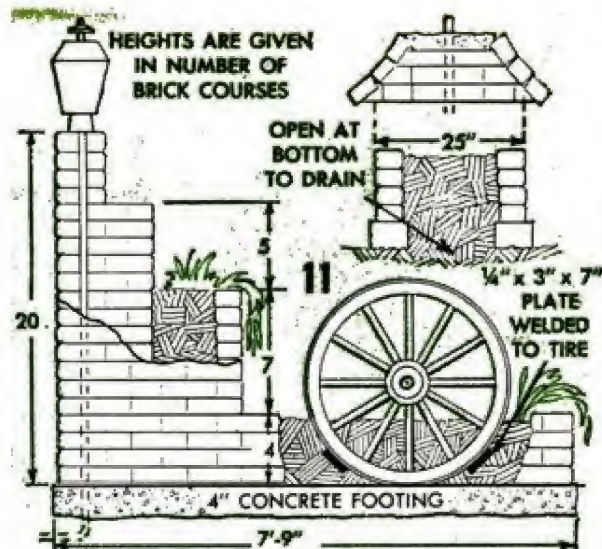
planter in the photograph has a lamp and a bench running along one side.

Various objects, such as wagon wheels, or hand pumps, Figs. 8 and 11, serve to add a certain flavor to a garden's semiformal arrangement. This motif may be extended to replicas of the old oaken bucket set on window shelves, Figs. 2, 4 and 5, or to an open-"well" planter. For more sophisticated decoration, a patio may be decorated with individual "gardens," Fig. 10, or divided from the rest of the garden by brick planters with uprights extending to the patio roof as shown in Fig. 6. ★ ★ ★

Novel arrangement combines a means of watering plants and illuminating the lawn. A ½-in. pipe through the masonry has shutoff valve connected to the pump handle. Lamp is switched on from the house



APRIL 1960



A combination of concrete and colored pebbles forms the dish top of this striking patio planter



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SWIMMING POOLS —



Luxury free-form pool measures about 16 x 34 ft. Gunited, it costs about \$3500 in the Los Angeles area

PART I

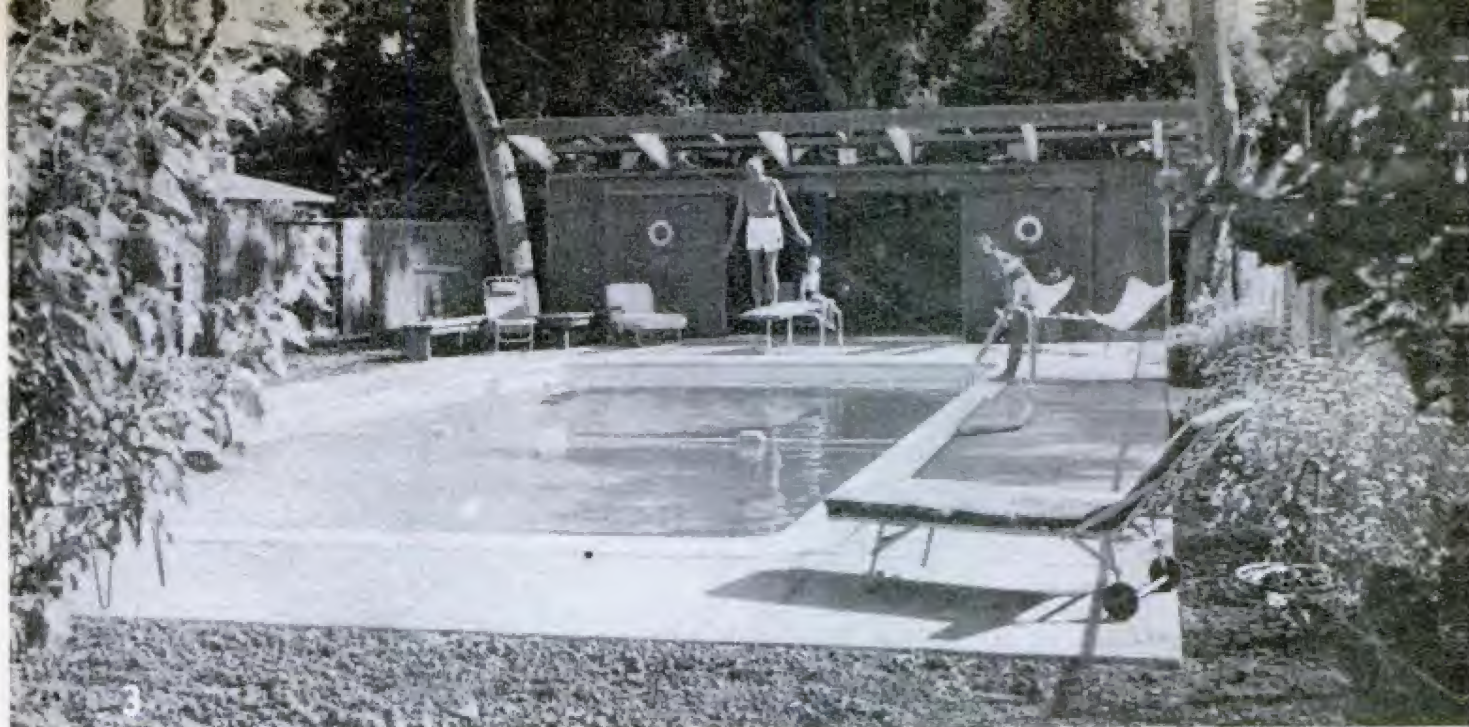


ADDING THE FINAL TOUCH of luxury, a swimming pool, undoubtedly, will be the one facet of modern outdoor living most appreciated by all members of the family. And, while it likely will carry the largest initial cost, it will be the least expensive in the long run as it will increase property value more than its original cost.

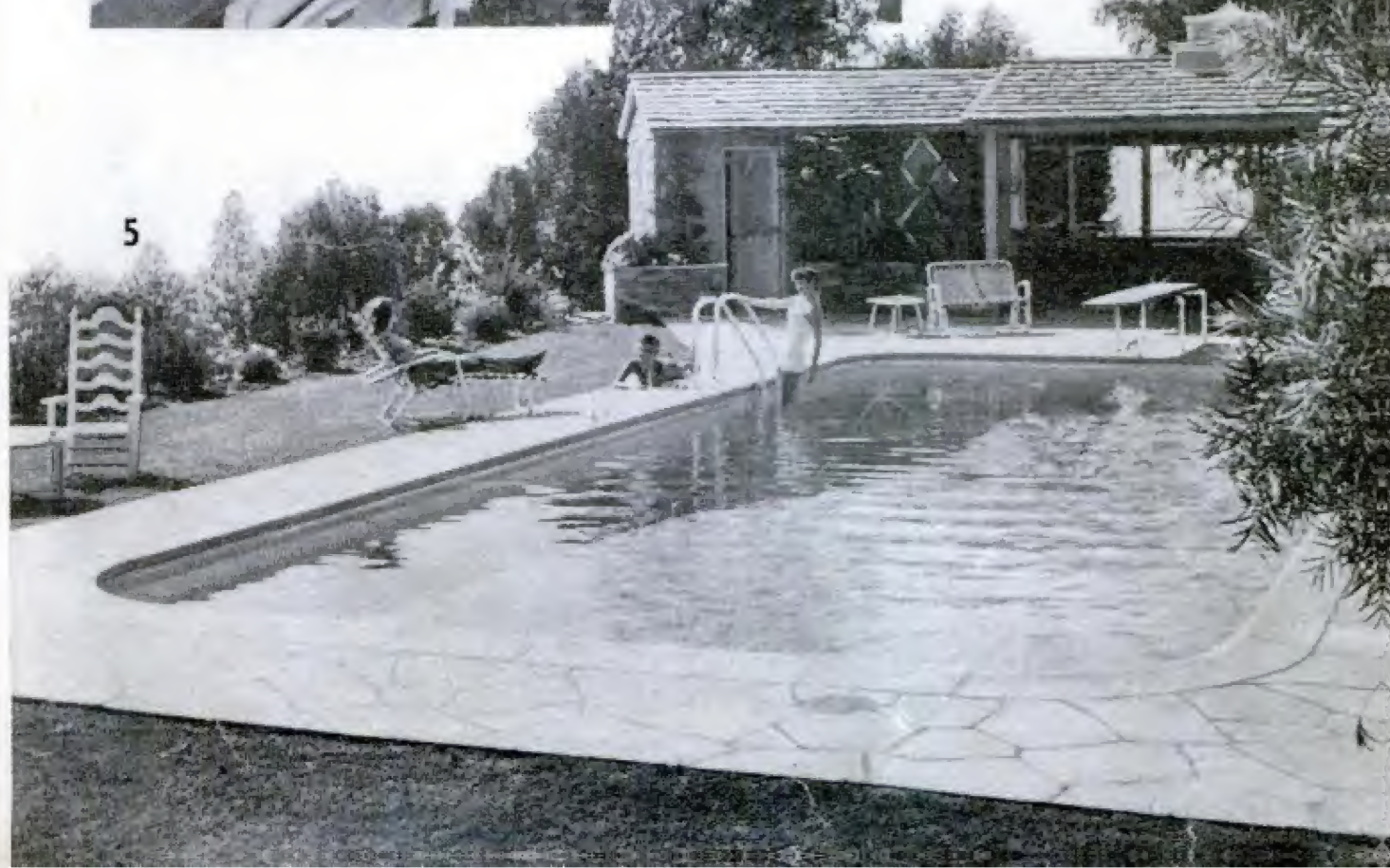
Built to various shapes and sizes, swimming pools generally are constructed by one of four methods—Gunited concrete, poured concrete, built up of concrete blocks, and plastic-lined over sand and concrete. In operation they are either the fill-and-draw type or the recirculating type which is pictured in Fig. 6.

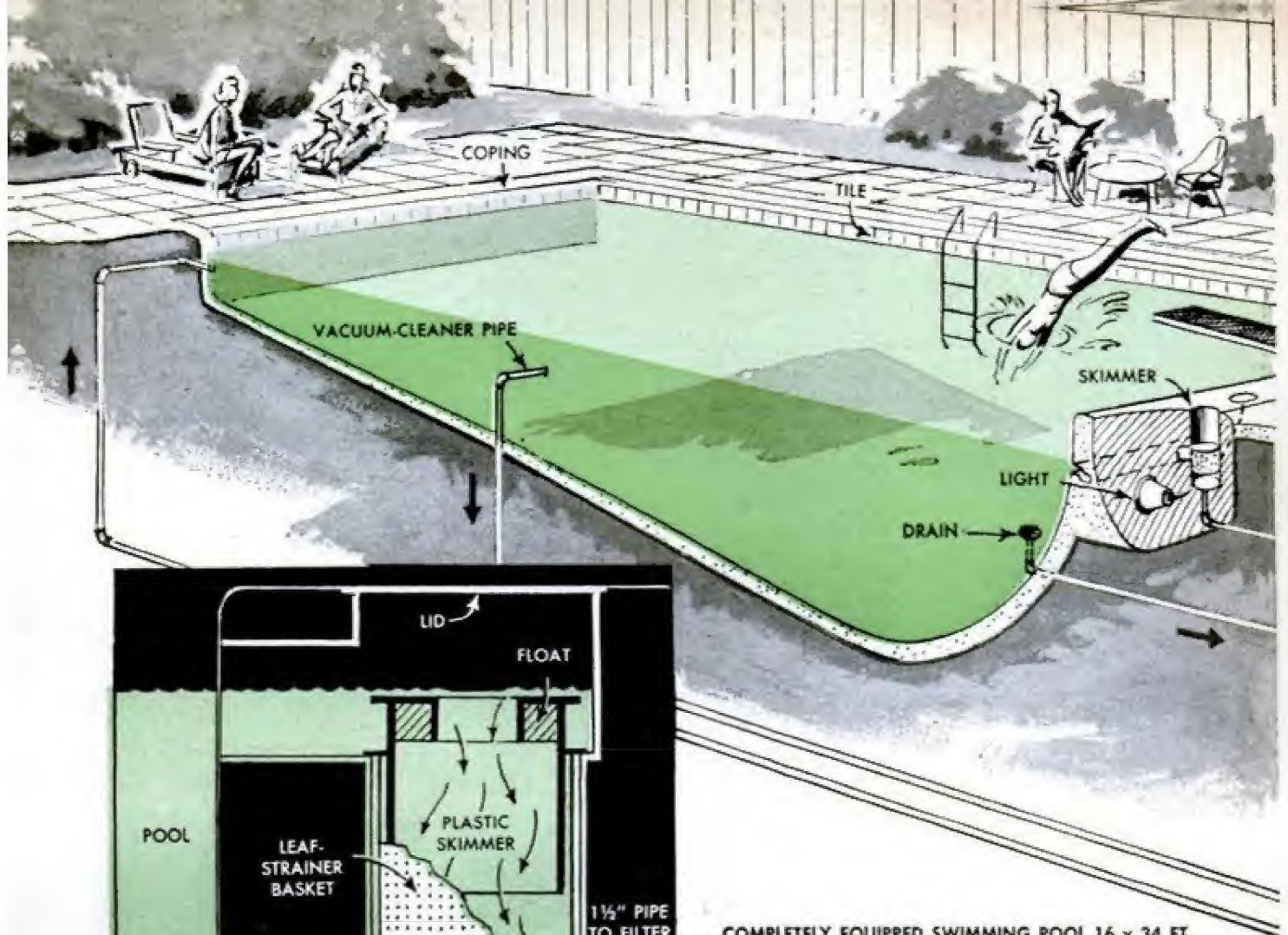
Larger Gunited pool in free form but expensive, cabana and all. Pool is made shallow at end in foreground to provide children play area





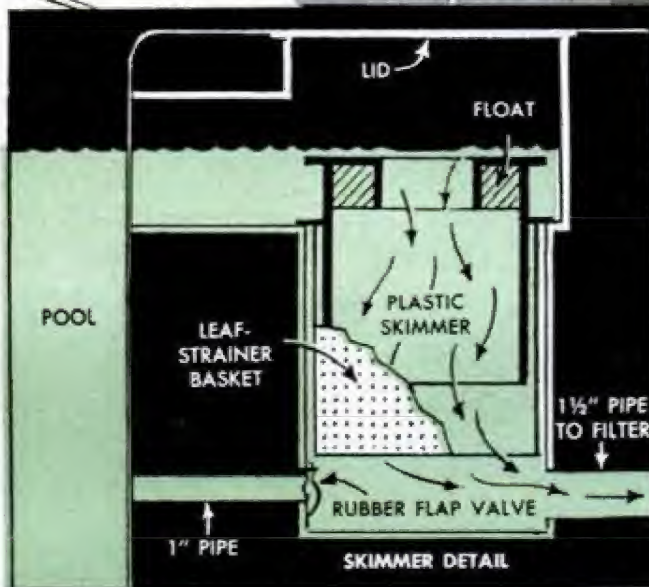
Above, this 20 x 42-ft. pool has everything — filter, heater, cabana with dressing rooms, even intercom and hi-fi. Left, flagstone coping, rock wall and plantings give this rustic pool a cool mountain-lake look





COMPLETELY EQUIPPED SWIMMING POOL 16 x 34 FT.

6

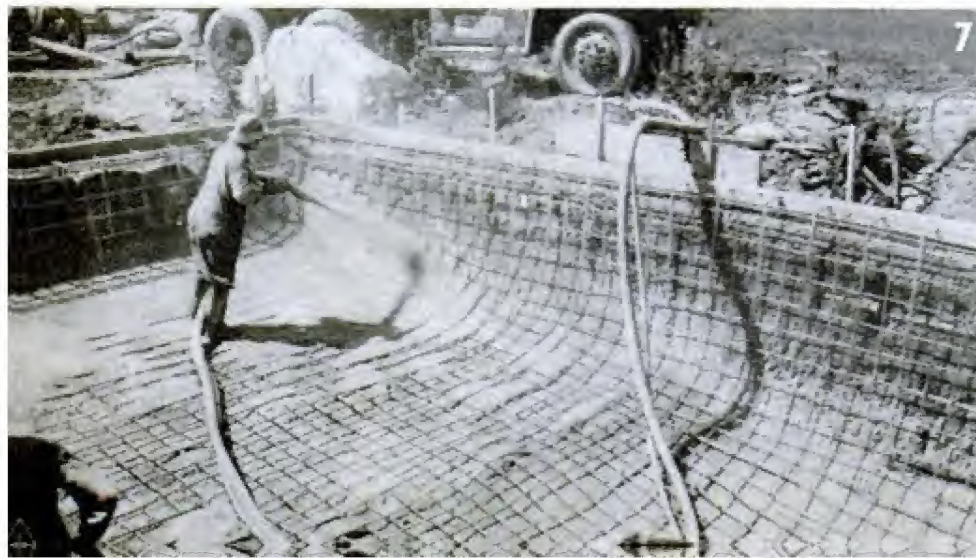


One of the most important things is the location of the pool. The location must comply with local codes on street setbacks and the like, and the site should be where power equipment and trucks can get to it. Any hand digging or wheel barrowing of materials in and earth out will balloon both time and costs. If your landscaping is already in, try to locate the pool where heavy trucks will do a minimum of damage. Avoid filled ground and hard rock, which will increase construction costs considerably.

For swimming, sunbathing, play—for full

future usage—place the pool where it will receive maximum sunlight. A sunny pool is always more enjoyable, and the free energy heats the water considerably thus reducing heating bills. Equally important is to place the pool where the house or high fencing and a cabana will protect it from the prevailing winds. A cool breeze reduces the months you can use it and also brings in dust and leaves to increase cleaning time.

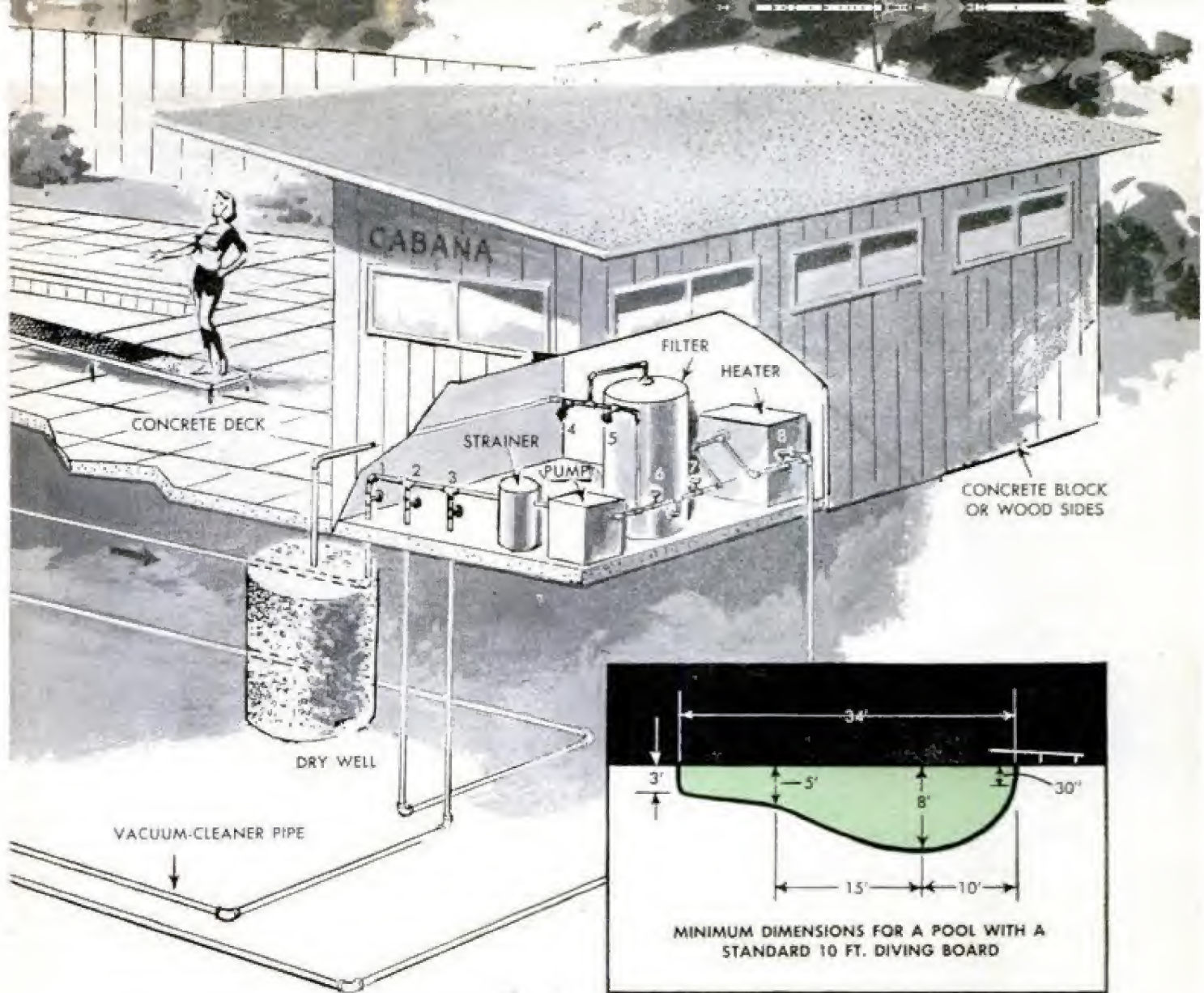
Most trees should be avoided. Any close-by tree which will shed leaves gives a continual pool maintenance problem. The



7

GUNITED POOL

Here the concrete is sprayed rather than poured. Two hoses feed dry-concrete mix and water under pressure to a single nozzle from which mixture is sprayed over framework of reinforcing-rods, wired together and blocked out 2 in. from the earth wall



leaves clog skimmers and strainers, and stain plastered pools if left on the bottom any length of time.

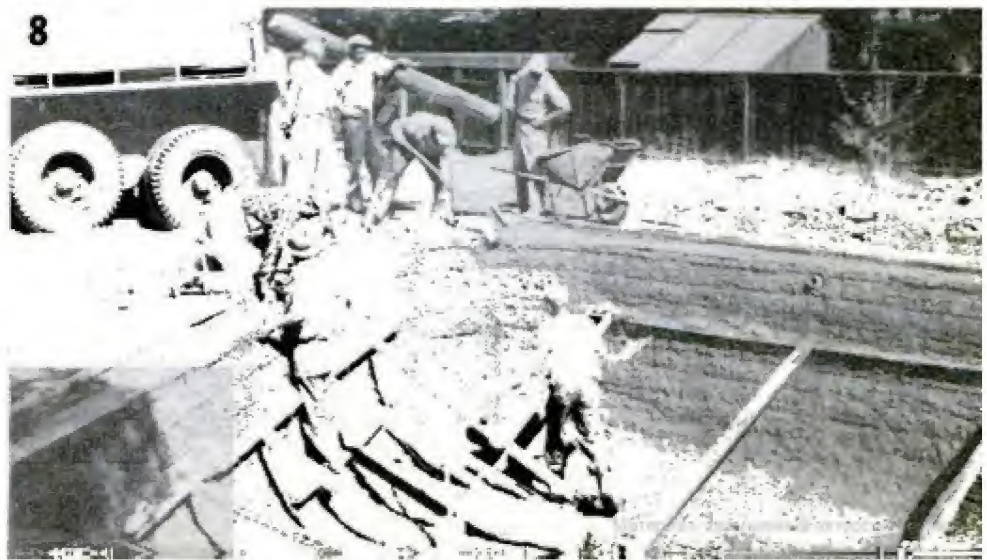
Your pool's size is mostly a matter of the budget and the space available, but not all. Figs. 1 through 5 and 9 and 10, show pools of many sizes and shapes. A large pool (20 x 40 ft. or more) will continue to be expensive, can require double the usual monthly costs for chlorination and heating, and considerable more time for cleaning. One 16 x 34 ft. seems most ideal; 75 percent of contractor-built pools today are about this size.

Smaller pools without diving boards have proved fully satisfactory.

The minimum pool for a standard 10-ft. diving board placed about 18 in. above the water is the 16 x 34-ft. size, dimensioned as shown in the right-hand detail of Fig. 6. Less depth or length of the deep area can be dangerous. A 1-meter board (one meter above the water) requires at least a 9-ft. depth. A 3-meter board needs a much larger pool with a 10-ft. minimum depth at 15 ft. distance from the deep end and the 5-ft. break 35 ft. from the deep end.

DRY-PACKED POOL

Here pool shell is "plastered" with stiff concrete mix which is packed in place over reinforcing wire with shovel. Note how wood braces keep the stiff mix from sagging on walls. Shell can be rounded as in guniting but must be made extra thick





Without diving board or ladder, this 30-ft. glass-fiber pool costs about \$3000 installed in areas close to manufacturer



Being well enclosed, this 20 x 40-ft. pool is easy to maintain. Features precast coping and a non-skid brick decking



Portable plastic pools afford limited swimming but lots of water play at low cost. This 18-ft. Doughboy retails about \$250

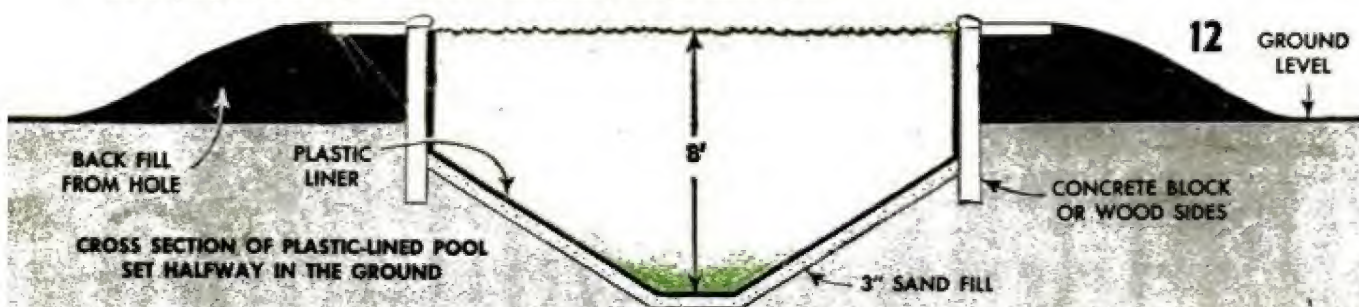
If your family is not particularly interested in diving, a pool with 5½ to 6-ft. depth is fully ample for active swimming and for diving from the pool's edge. A contractor will build the shallower pool for \$500 to \$1000 less, depending on its size, and it is much easier to build yourself. The depth also makes a considerable difference in the heating the water will receive from the sun. In many fairly cool regions, the shallow pool will be warm with no heating unit at all.

However, for adults and even small children, a shallow end with less than 3-ft. depth usually is unsatisfactory for swimming and play. For young toddlers, rather than reduce the shallow end to a 2-ft. depth or less, give them a separate plastic wading pool, or plan to keep the water in your pool a foot below normal level for awhile, or build an oversize playpen with a raised plywood floor to sink in the shallow end until the children learn to swim. The sides of a pool should be vertical for about 30 in. down to allow active swimming close to the edges.

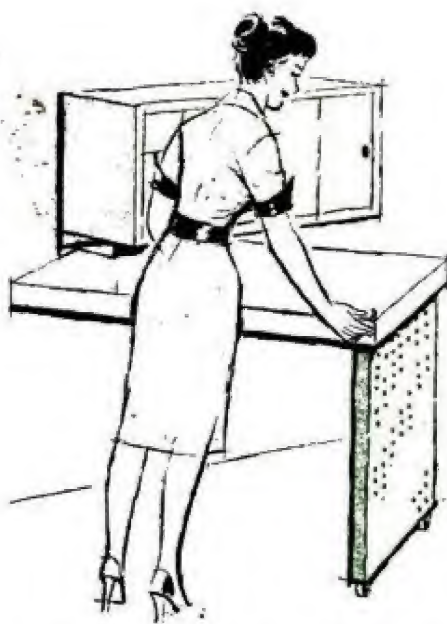
Most pools today are built of Gunited concrete. A builder's tab for a large fully-equipped 20 x 40-ft. Gunited pool placed in your yard will likely be over \$5000, over \$3500 for a 16 x 34-ft. pool. A Gunited pool has the advantage of being available in any shape desired and very easy to clean. Applied under pressure, the Gunited concrete is stronger than poured concrete, usually needs to be only 4 in. thick, and as its sides are curved there are no weak corners to give cracks. The Gunited concrete is reinforced with steel as shown in Fig. 7.

An equally strong pool can be built of poured, reinforced concrete, practically the same as building a basement. However, the squared corners at the bottom of a poured pool are somewhat difficult to clean, add nothing to swimming

(Continued to page 250)



X217



Placed in a corner of the living area or study, this desk is an attractive addition to any home. Its swing-away feature makes the most of limited space



Photos courtesy The Masonite Corp.

HANGING WALL DESK

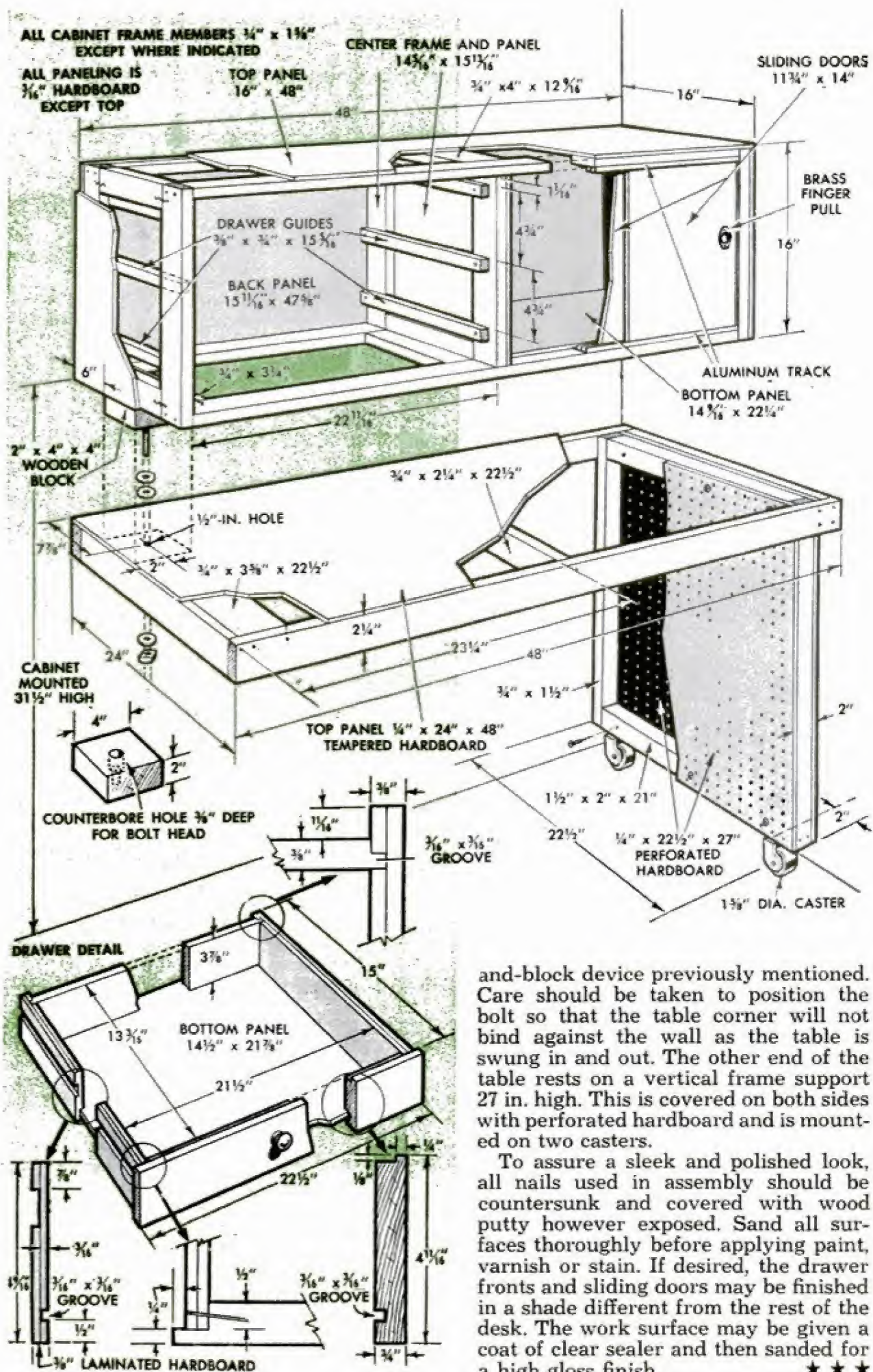
SLEEK AND MODERN in appearance, this hanging wall desk is compact and space saving, yet provides an ample work surface plus storage and drawer space. The desk consists of a wall-hung cabinet and a pivoting work table which may be swung against the wall when not in use. The cabinet is a frame of $\frac{3}{4}$ x $1\frac{5}{8}$ -in. stock covered with $\frac{3}{16}$ -in. hardboard. It is divided by a center panel so that one half accommodates drawers while the other half becomes a storage area. The cabinet frame is best secured with corrugated fasteners, and all joints should be set flush and square. When the frame has been assembled, cover the ends, back and top with hardboard, as well as the bottom portion of the storage area. Drawer guides should be tacked in temporarily until the drawers have been assembled and adjustments made for an easy, sliding fit. The sliding doors for the storage area are two pieces of hardboard measuring $11\frac{3}{4}$ x 14 in. which move in aluminum tracks screwed to the inside top and bottom of the frame. Screwed to the under side of the drawer section is a 2 x 4 x 4-in. wooden block through which runs a $\frac{1}{2}$ x 4-in. carriage bolt. This device, when bolted through one end of the worktable surface, will allow the pivoting action whereby it

will be possible to move the table out and away from the wall as it is needed. When assembled, the cabinet is attached to the wall with wood screws driven through the top frame members and into the wall studs.

The drawer sides are made by laminating two layers of hardboard, allowing for grooves for assembly and to engage guides, as shown in the drawer detail in the diagram on the following page. The drawer bottoms are hardboard while the front and back are of wood, cut to the size and in the manner shown in the diagram.

The work table itself is a simple 24 x 48-in. frame covered with $\frac{1}{4}$ -in. tempered hardboard. One end is pivoted to the bolt-





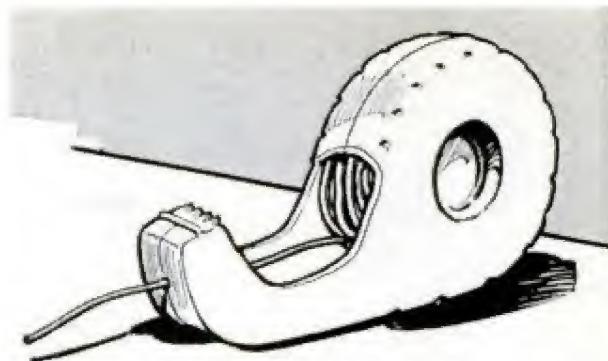
and-block device previously mentioned. Care should be taken to position the bolt so that the table corner will not bind against the wall as the table is swung in and out. The other end of the table rests on a vertical frame support 27 in. high. This is covered on both sides with perforated hardboard and is mounted on two casters.

To assure a sleek and polished look, all nails used in assembly should be countersunk and covered with wood putty however exposed. Sand all surfaces thoroughly before applying paint, varnish or stain. If desired, the drawer fronts and sliding doors may be finished in a shade different from the rest of the desk. The work surface may be given a coat of clear sealer and then sanded for a high-gloss finish. ★ ★ ★

Dispenser for Wire Solder Made From Tape Holder

Wire solder will not become twisted and mixed with the contents of a tool box if it is placed in its own dispenser. A dispenser may be made from a plastic holder of the kind used for cellophane tape. Wind the solder around the empty tape spool, place it in the holder and feed it through a hole in front of the holder as it is needed.

Hugh Lineback, Stillwater, Okla.



Curtain Rod Used as Mall Stick

When coloring or spotting large photographs, it is often difficult to keep from smearing the colors with your hand. To prevent this, use a discarded curtain rod as a mall stick. Rest one end of the rod on the edge of the board and support the other end with your free hand. This will give you steady support for fine critical areas.

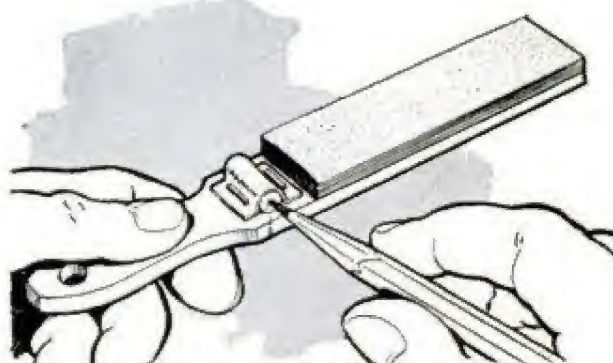
Wayne Floyd, Fayetteville, Tenn.



Filter on Sanding Board Cleans Draftsman's Pencil

Here's an odd twist whereby a draftsman can make use of a cigarette filter. Wrap the filter in masking tape and staple it to a regular sanding board as shown in the illustration at the right. In this manner, the filter can be used to remove powdered lead from the tip of a freshly pointed pencil.

A. Champion, Toronto, Ont.



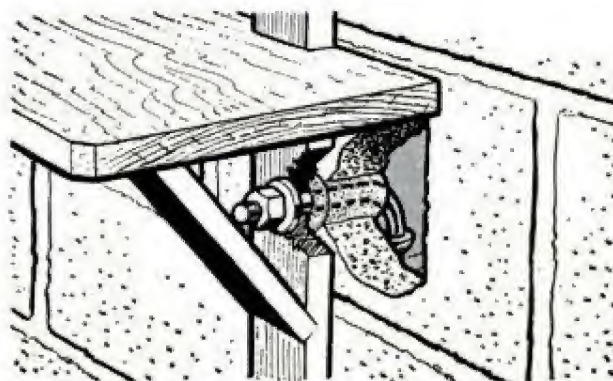
Matchbox Scratching Surface Subs for Sanding Board

If a draftsman's sanding board is not available, a good substitute is the scratching surface of a safety-matchbox. Once a pencil has been initially sharpened, the scratching surface is of a fine enough grain to give it an extra fine point, or to sharpen a stick of lead in a lead holder. The box may also be used to store extra pieces of lead, as well as penpoints.



Bolts Used as Masonry Anchors

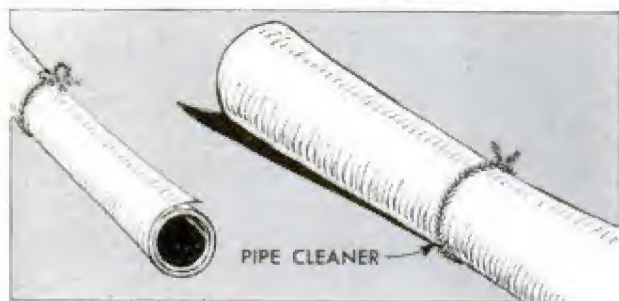
Shelves and other fixtures can be fastened to a concrete-block wall even if toggle bolts or masonry anchors are not available. Drill a $\frac{3}{4}$ -in. hole into the block, through to the hollow core. Bend the head end of a $\frac{1}{4}$ -in. stove bolt to a right angle, place it in the hole, and cement the bolt in place. A nut run up the protruding threaded end will secure any object to the wall.—J. D. Campbell, East Alton, Ill.





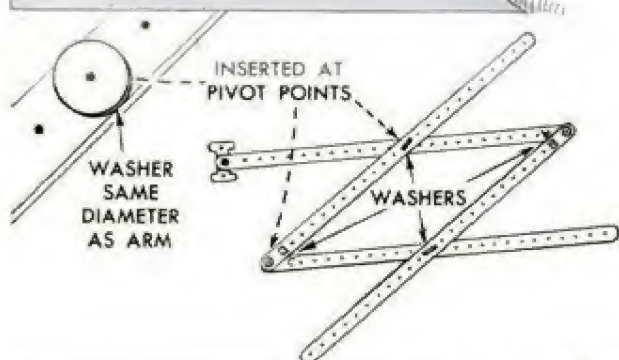
Dog-Dish Anchor

An over-eager puppy can't push his food dish around the floor if it is cemented to a disk of linoleum as shown. The disk also catches stray food particles, helping to keep the floor clean.



Pipe-Cleaner Ties

Pipe cleaners make excellent ties for rolled blueprints and wrapping paper. A twist of the ends fastens or releases them quickly.—G. E. Hendrickson, Argyle, Wis.



Pantograph Lubricant

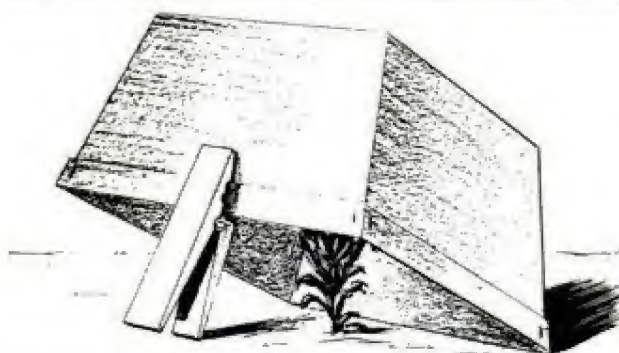
Washers cut from waxed paper permit smooth operation of pantograph arms when they are inserted at the pivot points as indicated at left.

W. C. Wilhite, Carlinville, Ill.



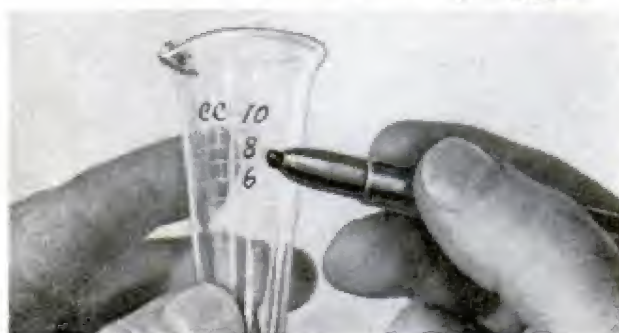
Newspaper Torch

For quick lighting of an incinerator or campfire, form a cone from a newspaper to shield the match from the wind as shown. Then light the paper on the inside and use it as a torch.



Seedling Sunshades

Seedlings are protected from the sun during the first few critical days after transplanting, when berry boxes are propped up over them as shown. Ample light and ventilation are admitted for plant growth.



Darkroom Graduate

To make etched graduations and numbers on a graduate more legible for use in a darkroom, coat them with a black marking crayon. Wipe the surplus from the glass, leaving the crayon only in the etched lines.

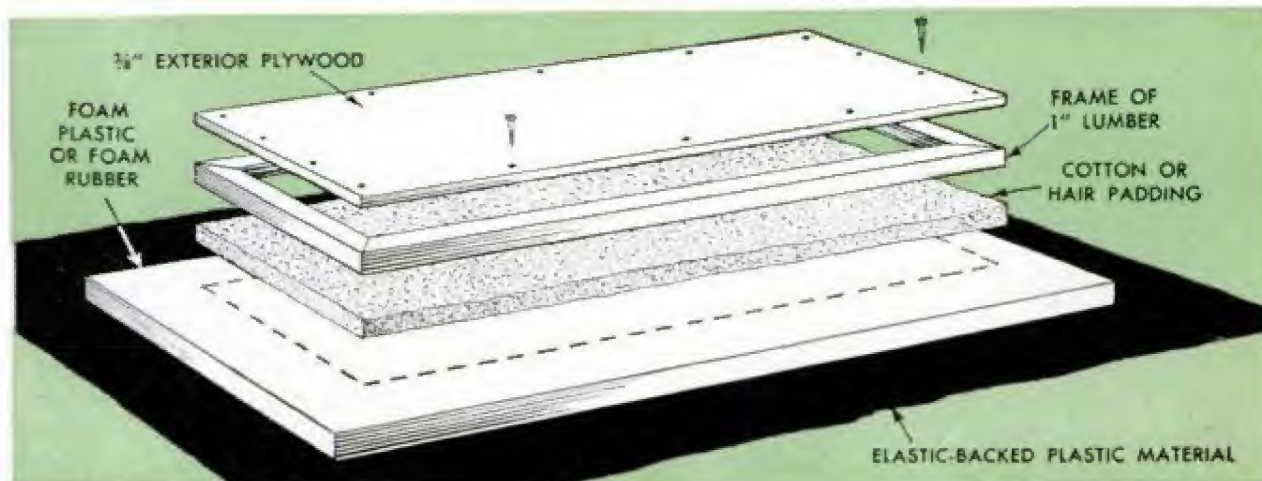


UPHOLSTER YOUR BOAT

By James Lockhart

IF YOUR runabout needs new seat upholstery, here is an economical way of doing a smart-looking job. Simply remove the old upholstery, including the panels to which it is fastened, and install cushions made up as shown in the drawing below. Cushions like these also can be installed in a boat without upholstery, using metal brackets or clips to fasten them in place.

Plywood panels for seat backs and bottoms are cut to leave enough clearance at the edges to fit flush when upholstered as shown in the photos. When fastening the cover material to the plywood, first drive a few screen staples at each end and side, pulling the material roughly into position as you go. Then pull out the wrinkles and refasten it permanently.



BUILDING THE 24-FT. **M** HOUSEBOAT

Conclusion

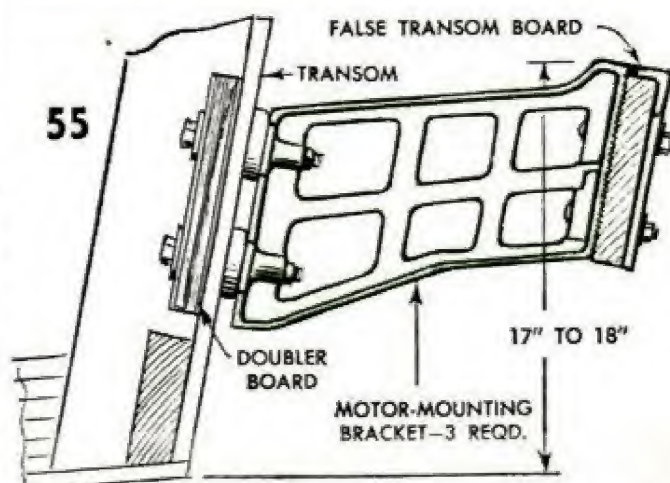
WITH THE cabin interior completed insofar as the cabinet work is concerned, the happy day of christening and launching your houseboat is near at hand. After painting, there will be drapes to add to the windows, book and magazine racks to make and lighting fixtures to install. Exteriorwise, the remaining work includes bolting motor-mounting brackets to the stern, adding the cabin-roof ladder and installing the chrome railing across the stern and around the cabin roof. Outside painting, of course, precedes the final step of adding the deck fittings and hooking up the motors.

Multicolored texture paint makes a most attractive finish for the cabin interior. Used a lot in cruiser and runabout interiors, it covers fir plywood perfectly and produces a durable, washable finish. It's a spray paint which contains two or more paint particles held in suspension. When applied, these particles produce a pleasing spatter effect to the background color. You have a choice of several colors, all of which can be sprayed perfectly with the spray attachment of an ordinary vacuum sweeper. The interior of the PM houseboat was done in a white salt-and-pepper finish, this being applied to all the plywood surfaces, as well as the cabin roof beams. As with most paints, a prime coat of the basic background color is recommended. This is a

plain, flat-drying finish which is applied with a brush. Before the multicolored paint can be sprayed, surfaces not to be painted must be masked. This includes the fixed windows, countertops and mahogany trim. Drawers and cabinet doors should be removed. Spraying technique differs from ordinary application only in that occasional short bursts have been found to give the best spatter. Being considerably thicker than ordinary paint, you will get a somewhat heavy application. This, however, tends to flatten out upon drying, concealing all grain and surface defects beautifully. If you find the consistency too thick for proper spraying, the paint can be thinned sparingly with water. All the counter tops should be covered with plastic laminate, and the mahogany trim finished natural with a couple of coats of sealer. Vinyl makes the best covering for the floor and the raised platform of the dining nook.

While one 35-h.p. outboard motor will move your houseboat along at about the same speed (8 to 10 m.p.h.) as two 18-h.p. motors, two outboards will give you better maneuverability. In either case, motor-mounting brackets are required to support

Special metal brackets bolted to oak plank provide transom board for mounting twin outboard motors to stern. Set consists of three cast-aluminum brackets



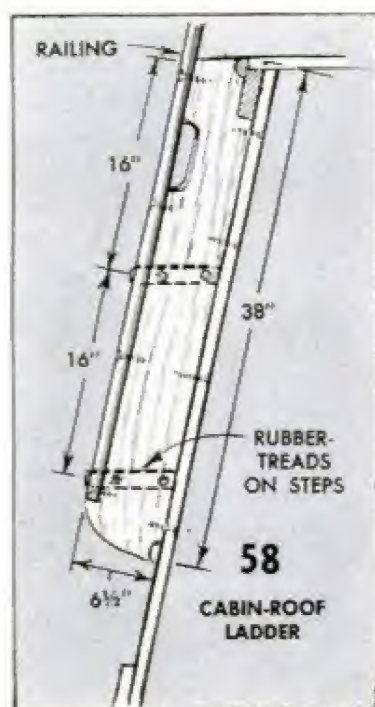
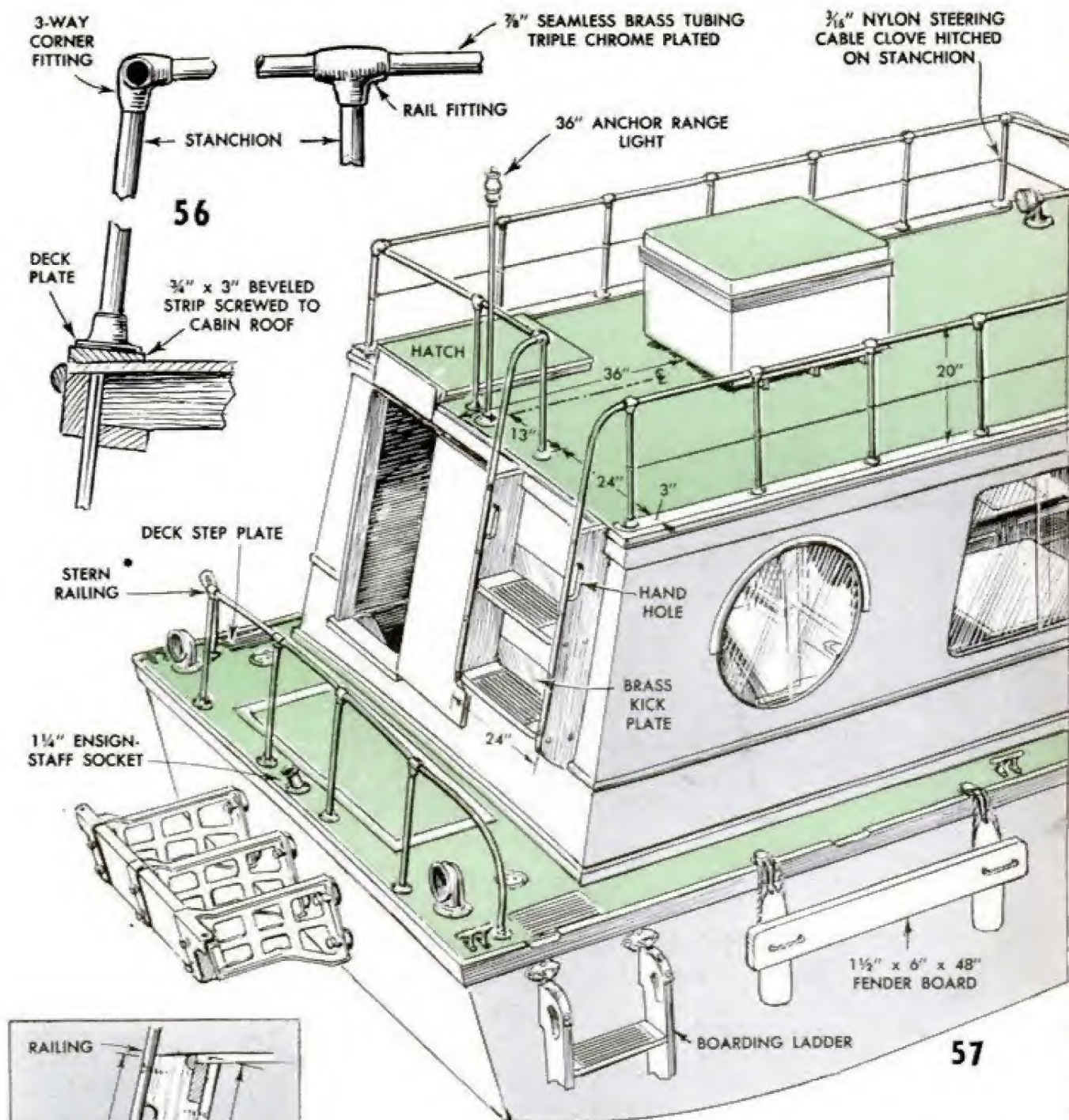
a false transom board for the power units. Three brackets are needed and Fig. 55 shows how they are held with bolts passing through the doubler board backing up the transom planking. The transom board itself is a 1½-in. oak plank bolted to the outboard ends of the cast-aluminum brackets. Note that the brackets should be mounted to bring the top of the plank about 18 in. above the bottom of the hull. The brackets, incidentally, are special fittings which must be ordered direct from the manufacturer.

The fancy chrome-finish railing is assembled from standard deck-railing fittings and tubing. Fig. 56 shows how the deck plates (flanged sockets) are canted inward 5 deg. by screwing them to beveled strips attached along the edges of the roof, port and starboard. Note how the railing continues down the cabin-roof ladder to form hand rails. A less expensive railing can be



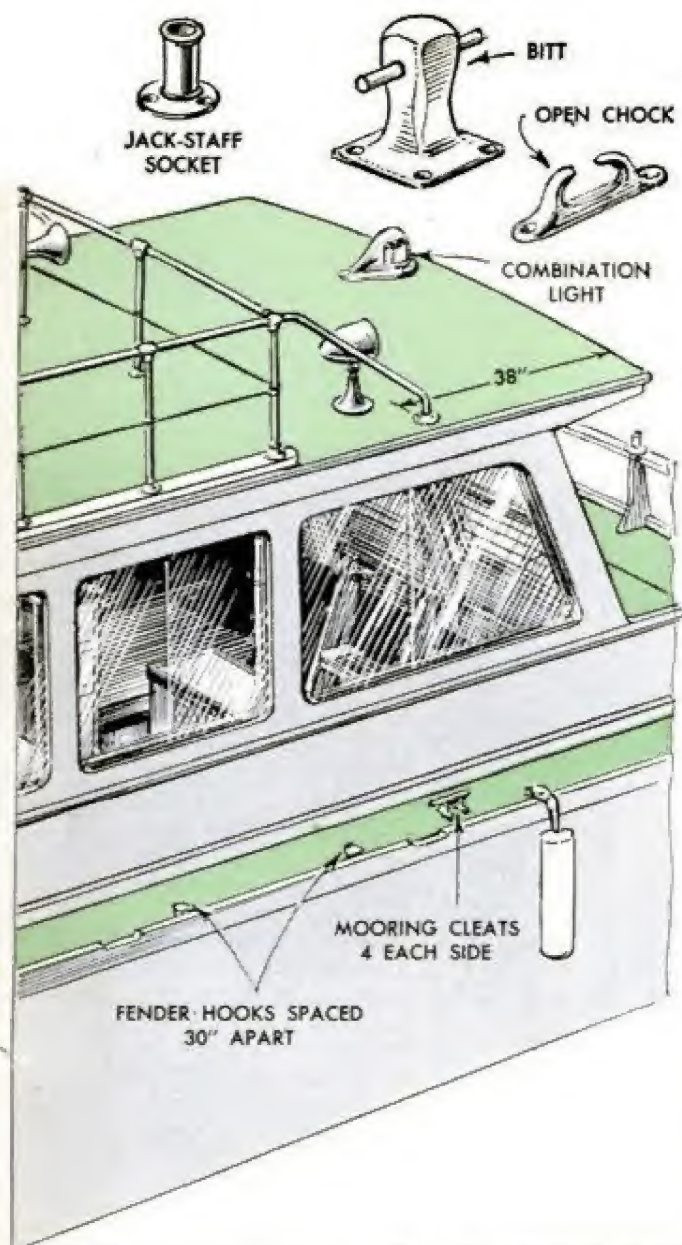
Decal numerals of the assigned registration number are applied at the bow, both starboard and portside





made from common pipe and pipe fittings and painted. Here it will be necessary to weld 90-deg. elbows to the ends of the five corner posts to improvise three-way corner fittings. Other than this, regular tees and flanges will do nicely. If necessary to cut costs, the railing can be omitted altogether, although it does add a classy look to the overall design, as well as provide a necessary guard rail when the roof is used by the family as a sun deck. Actually, the railing, as well as the ladder, would not be permanently installed until after final painting. Fig. 58 details the ladder. The treads are covered with regular rubber step plates, and brass kick plates are screwed to the cabin wall to protect it from toe marks. The wood parts of the ladder are mahogany.

The interior view of the hold below the hatch cover in the after deck, Fig. 59, shows the location of the two 18-gal. fuel tanks and how they are lashed down to wooden saddles with hold-down straps. Fill pipes for the tanks are fitted



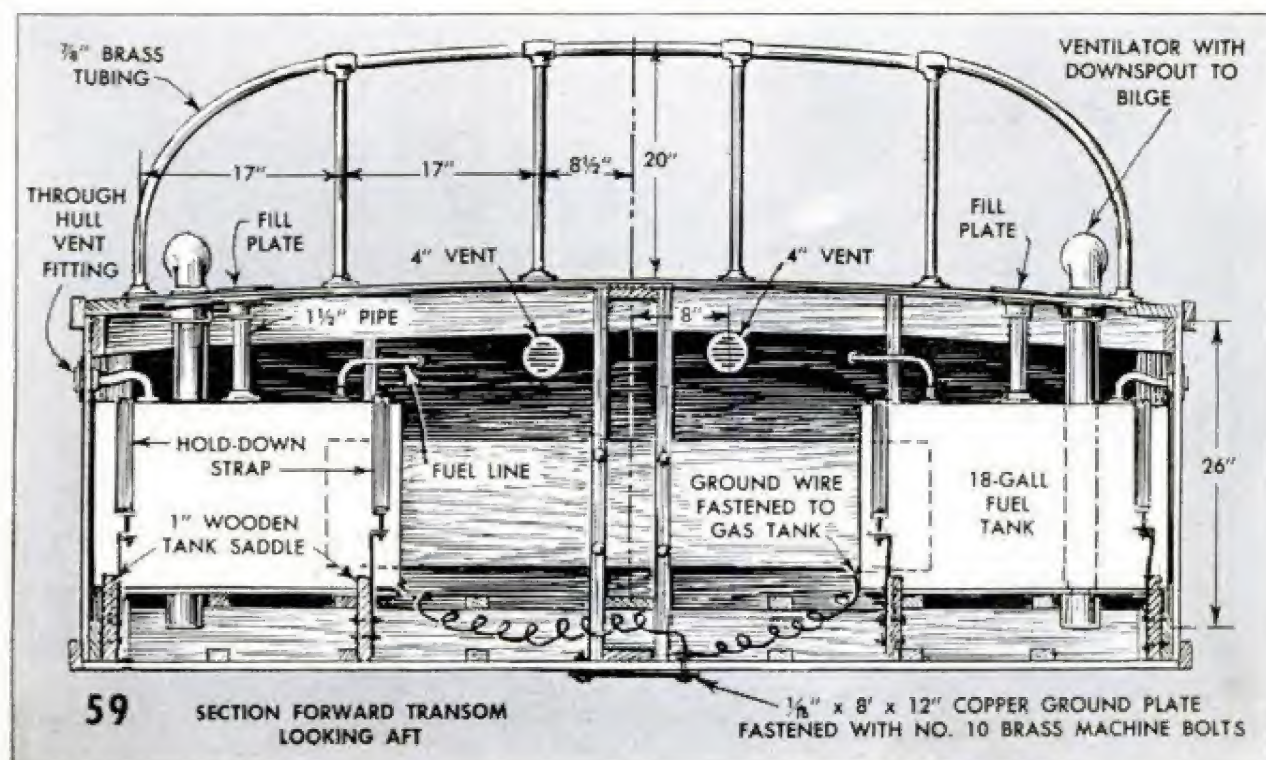
with deck plates, and fuel lines are brought out through holes at the top of the transom. Each tank is vented with a Neoprene hose which is connected to a through-the-hull fitting in the side planking. Notice that each tank also is grounded to a copper plate bolted to the bottom of the hull. The hold itself is vented through two louvered transom vents and two bilge downspouts fitted with hoods. The 12-volt storage battery needed to power the cabin and navigation lights is kept in the fuel-tank compartment. Three lighting fixtures are installed in the cabin; an overhead dome light amidships, a bullet-type bulkhead light in the enclosed head and a bullet fixture on the dining-nook bulkhead. Both cabin and navigation lights are on a single parallel circuit with individual switches at the fixtures.

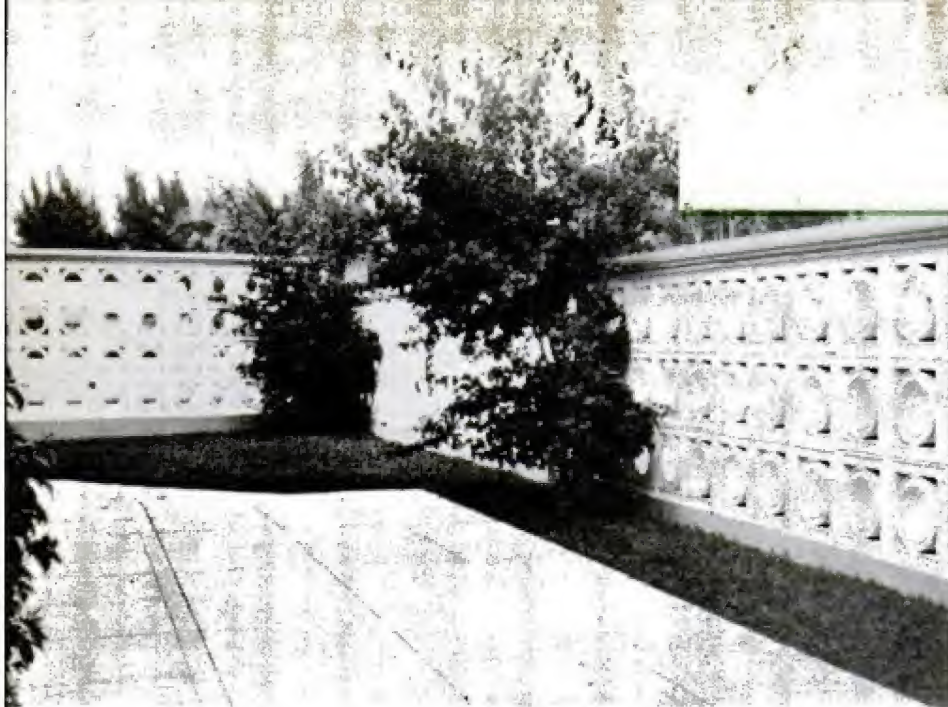
The overall view in Fig. 57 shows what you will need in the way of deck fittings. The bitt is securely bolted to the king plank at a point forward of the fore-deck coaming. The open chock is centered and screwed to the bow toe rail. The jack-staff socket is centered on the knee which braces the bow coaming. Four mooring cleats are spaced along the covering boards, port and starboard, while fender hooks are spaced about 30 in. apart. An anchor range light

(Continued to page 230)

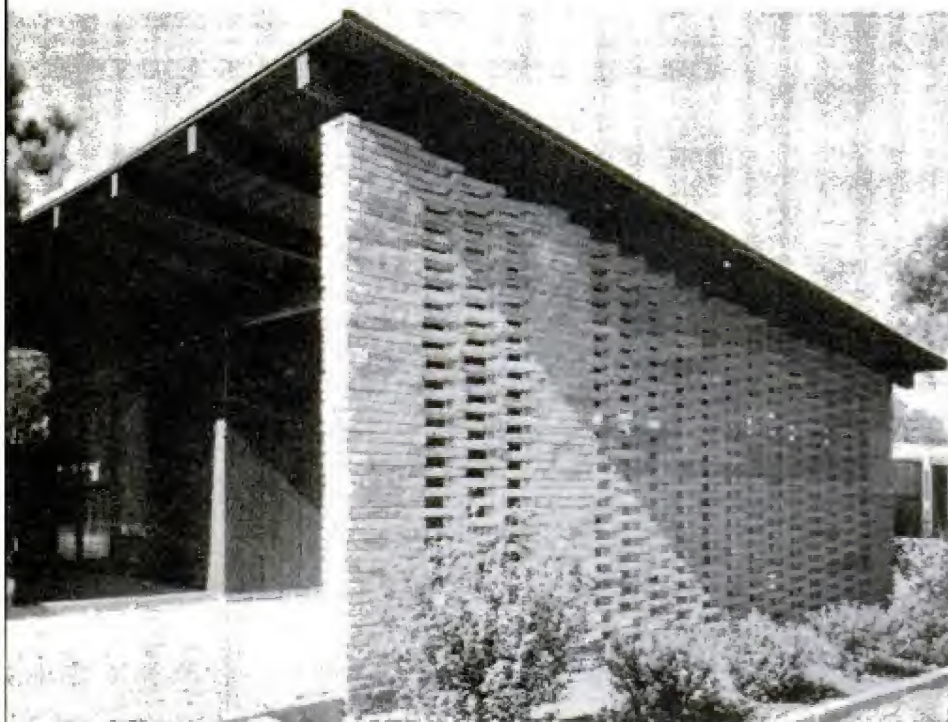
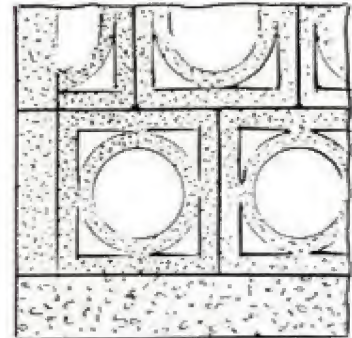
HOUSEBOAT BLUEPRINTS

If you prefer to work from plans larger than magazine-size, blueprints can be purchased at \$10.00 per set of eight sheets by writing to Popular Mechanics, Blueprint Dept., 200 East Ontario St., Chicago 11, Ill.

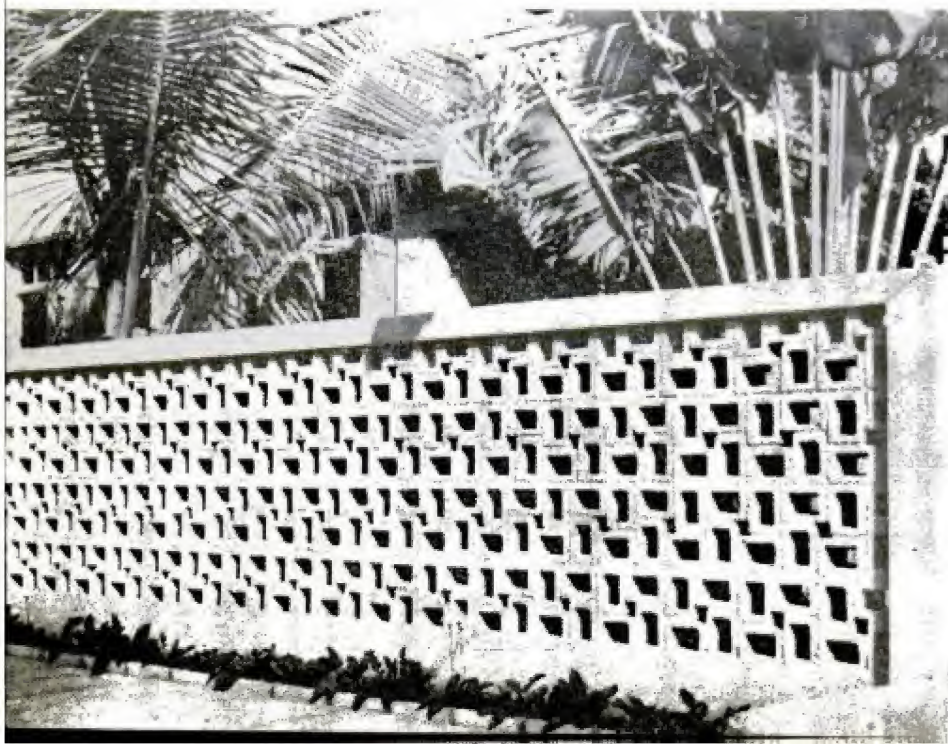
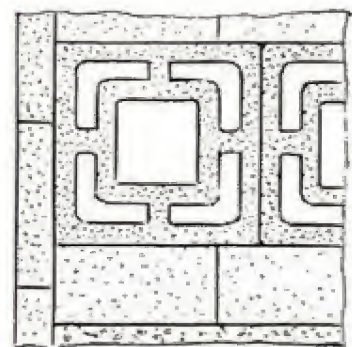




EVER THINK of using standard concrete blocks to build a decorative garden wall? A fine example is shown at the left. Here 8 x 16 x 16-in. chimney-flue blocks, placed on edge, are mortared side by side in rows. Units can be laid brick-fashion or aligned vertically. Wall is built on concrete footing and ends are finished with 4 x 8-in. blocks



OPEN SECTIONS of attractive carport wall at left are formed by lapping ends of narrow 16-in. unpressed concrete blocks. The resulting filigree, or pierced design, makes the wall blend with the surrounding lawn and shrubs. Spaced piers of brick add strength to finished wall. Concrete bricks used here measure 1 1/2 in. thick, 4 in. wide, 16 in. long

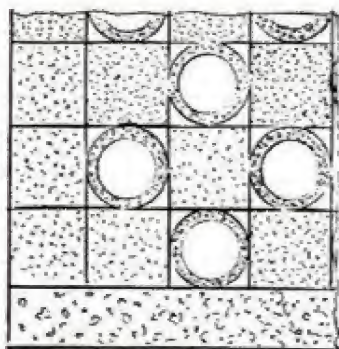


MODULAR CONCRETE core blocks are used in this attractive patio wall. Interesting geometric pattern is formed by alternating position of blocks in each course, placing one on its side, the other on end, etc. Blocks of second course are laid in a reverse position, third course reverts back to position of the beginning or starter row of core blocks

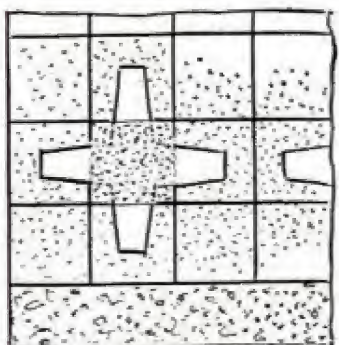
POPULAR MECHANICS

WALLS

EVEN COMMON concrete blocks laid as a solid wall make a most durable and practical patio windbreak and screen. In the photo at the right, two adjacent walls form corner for outdoor fireplace. Open "egg-crate" roof ties walls at top and serves as sun diffuser. Upper rows of blocks are laid "open" to form decorative pierced effect to relieve plainness



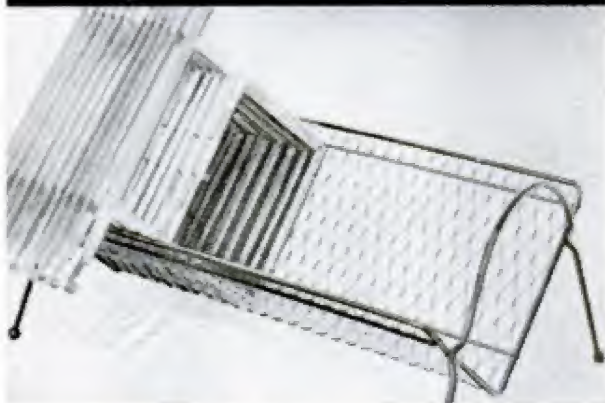
LOW WALLS around patio floor perform double duty when made to serve as planters. Two rows of narrow unpressed concrete blocks are laid around perimeter of patio slab and filled with dirt. Such walls reduce out-in-the-open feeling while high plantings afford partial privacy as can be seen in the photo at the right. Blocks are laid 24 in. high



FILIGREE INSERTS of ornamental concrete add a distinctive touch to the garden wall shown at the right. Inserts are concrete castings which are mortared in openings left in the upper courses of the wall. Note that mortar joints are aligned vertically so that piers, two blocks wide, can be formed to create openings. Mortar joints are struck or raked



PHOTOKINKS



WHEN EQUIPPING a home darkroom, the beginner will often make use of discarded items. Such is the case here where a wire-type book trough was found to serve perfectly as a draining and storage rack for cut-film hangers. It can be put to good use, too, for holding cut-film holders, as well as boxes of sheet film. When used as a draining rack, a coat of clear shellac or lacquer will prevent the wire from rusting.



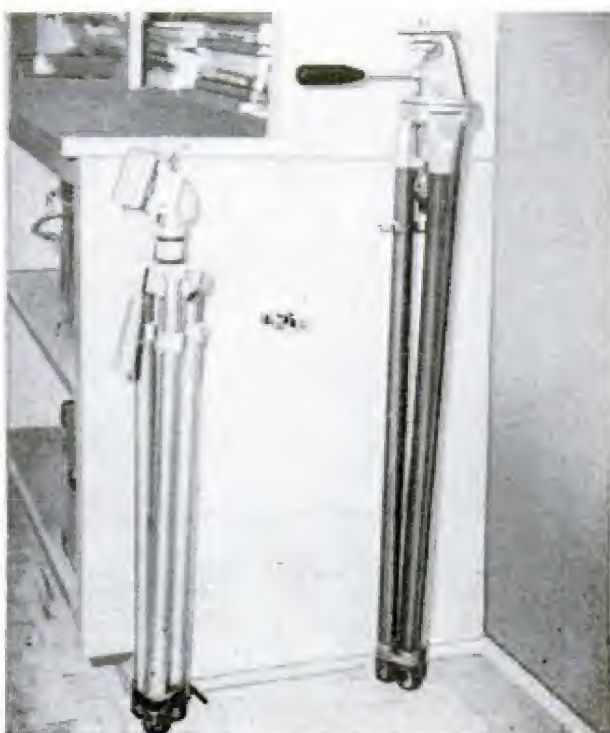
PERHAPS THE MOST convenient place of all for carrying your filters is on the camera itself. Here they are at finger tips whenever needed without having to search through a cluttered tote bag. Cemented to the top of a press-type camera, for example, the screw-top filter box will not interfere in any way with the normal operation of the camera and yet be right at hand for quick use when needed on the spot.

TIRED OF TEARING the darkroom apart looking for the right filter? Place a piece of adhesive tape down the side of the filter case and label it at the level of each filter box. To avoid storing a filter in the wrong place order, it is a good idea to label the individual filter boxes as well to coincide with outside markings.



WHEN A SKYLIGHT (haze) filter is used on the lens of a folding-type camera, it must be removed each time or the camera won't close. There is a way you can avoid this when the camera is used at the time solely for outdoor color. Simply mount the filter semipermanently over the rear lens inside the camera bellows. Here it will not interfere with the closing of the camera whatsoever. A strip of adhesive tape, wrapped around the rims of the lenses, will hold the two together and permit easy removal of filter.

HAVING TROUBLE storing tripods? Leaned against the wall they are sure to fall or be kicked over. Why not clip them to a wall or inside a door with clips normally used to hold paintbrushes and hand tools?





How To Care for Marble

Beauty and durability of marble are again making it a favorite in the American home. Keeping its sleek surface in good condition, however, takes a bit of know-how. For example, soap will work its way into the marble's somewhat porous surface and eventually cause it to yellow. For superficial stains, use a bit of detergent instead. Normally, clear water is enough to keep the surface clean. Grease stains are best removed with an equal mixture of acetone and amyl acetate, available in most drugstores. Saturate a cloth with the mixture and weight it down over the stain. Remove the cloth only when it is dry. Remember, the mixture is inflammable and should be handled with care. Coffee stains come away with a mixture of water, 4 parts and glycerine, 1 part applied in the same manner. In all cases, after application of the cleansing agent, rinse the surface with clear water and apply a coat of wax.

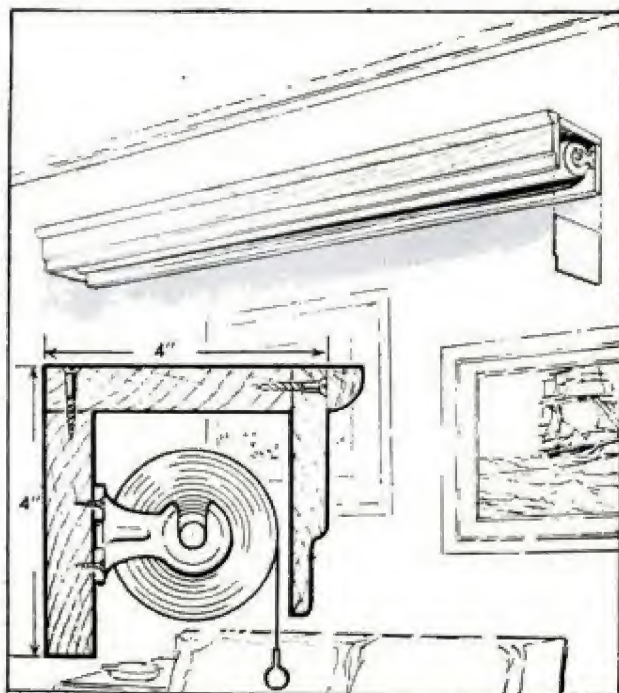
M. C. Anderson, Arlington, Va.



Wall Light Hides Film Screen

With this mounting, a screen for home movies or slide projection can be placed permanently in the living room and remain unnoticed except as an attractive boxed-in "wall light." It is made of two pieces of $\frac{1}{2} \times 4$ -in. white pine long enough to accommodate your screen, a piece of flat molding of the same length, two window-shade brackets, and enough hardboard to cover the ends. Screw the pine sections together as shown in the illustration and close the ends with the hardboard. Screw the molding onto the front and mount the screen on the window-shade brackets. If desired, space can be allowed for a fluorescent lamp to be placed inside the mounting, making the device in fact, a wall light. Used to illuminate a wall picture, the mounting will thus serve two purposes.

Mrs. F. W. Davids, State College, Pa.



Solving HOME PROBLEMS



1. If you have had the wind slide garments together when placed on a clothesline on hangers, splice a short chain into the line at one end. Then slip the hanger hooks into the links of the chain and the hangers will stay put. Use a medium size chain of sufficient length to suit your particular needs



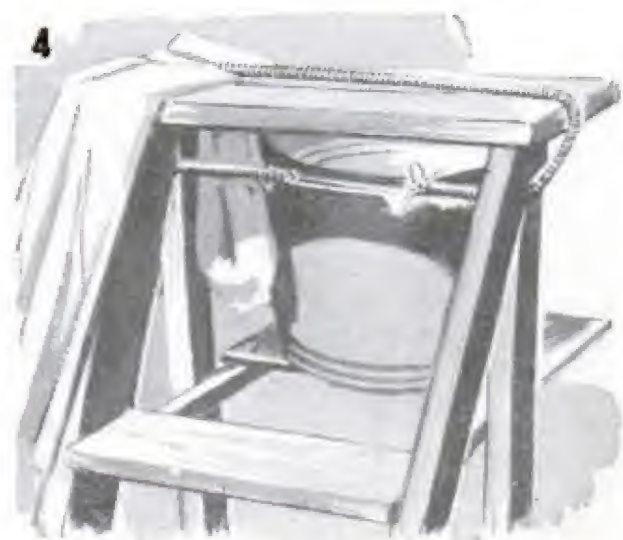
2. You won't have to stoop and hunt for the soap in the shower if you sew a soap pocket to one of the curtains. A plastic tobacco pouch is ideal for this purpose. Be sure to locate it at a height suitable for members of the family—even the little tots

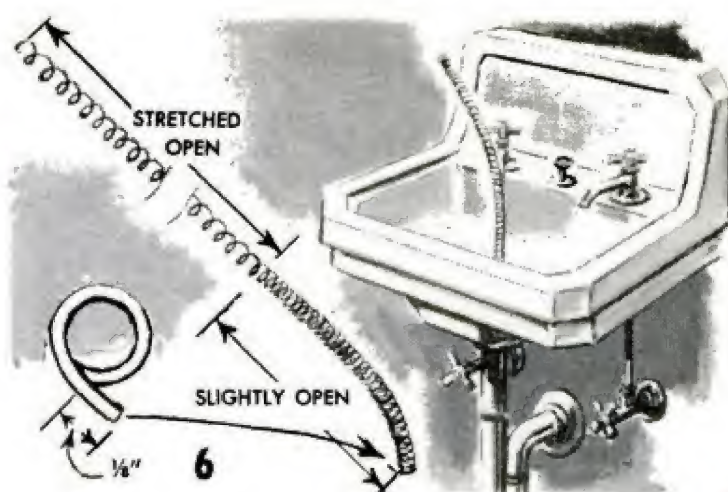
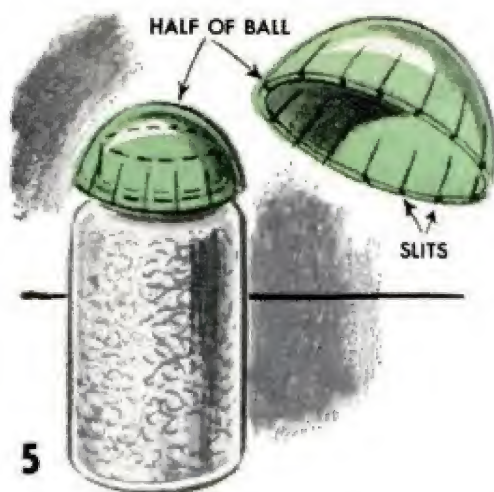
3. Many suggestions have been made for removing a broken lamp bulb, but one of the most practical is to use the cork from a vacuum bottle. Even when using the cork, it is a good idea to wear gloves for added protection against cuts from broken glass

4. Getting off a ladder while washing windows to retrieve cloths that have been dropped or blown off will be unnecessary if they are slipped under a spring around the top step of the ladder. A screen door spring, or one used as a curtain rod, is best for this purpose. Tie the spring ends together

5. If you can snatch one of Junior's hollow rubber balls, you have the makings of an ideal "palm wrench" for loosening lids on fruit jars. Cut the ball in half and then slit one piece around the edge so that it will better conform to the shape of the lid

6. When a kitchen or bathroom drain becomes clogged and there is no tool at hand to clean it, try a spring-type curtain rod. Open the coils by stretching, leaving about 3 in. at one end just slightly opened. Straighten the end of the end coil as indicated. Insert this end into the drain, using a cranking motion. Repeat until the drain is opened





7. To keep caster wheels from making streaks on hardwood floors, apply a thin layer of cellophane tape to the casters on furniture. Be sure the wheels are clean otherwise the tape will not adhere, and do not let it overhang the edges of the wheels. If it does, it may be torn off when the wheel rotates



8. Most window air conditioners have finishes similar to those on cars and should be cared for in the same manner. Wash and wax the finish at regular intervals so it does not become drab looking or deteriorate and permit the metal underneath to rust



9. An easy way to start a siphon is to roll the hose tightly, leaving only enough at one end to insert into the container. After inserting the hose, let it unroll quickly. The vacuum resulting from forcing the air from the hose by rolling and then unrolling it will start the siphoning action quickly

10. Hard, dry putty that seems almost impossible to remove will come off easily if it is first coated with lacquer thinner. Use a small brush and apply enough to soak the putty. Then wait a few minutes for the lacquer to penetrate. The putty then should lift off easily with a sharp chisel or a putty knife





Durable Surf-Fishing Spike Made From Angle and Pipe

Here is an idea which will enable the surf-fishing enthusiast to make his own surf spikes. Make the tube of the spike from a piece of pipe with an inside diameter of $1\frac{1}{2}$ in. It should measure at least $11\frac{1}{2}$ in. long. The spike itself is a 1×1 -in. steel angle, 15 in. long. Aluminum or brass tubing and angles may be substituted if preferred, and the length of the spike may be varied to suit individual needs. The angle is attached to the tube by means of a $\frac{1}{4}$ -20 brass roundhead machine screw and a wing nut and washer. The screw is inserted into one of several holes drilled through the pipe and the spike. The holes make it possible to adjust the spike to suit the various conditions which may be encountered on a fishing trip. A stout cord tied to the spike and to the fishing rod will further insure against the possibility of lost tackle should the rod by some means be pulled from the tube.

Leon Reissman, Brooklyn, N. Y.

Bench Set on Iron Supports

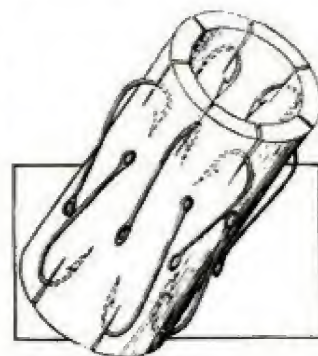
This simple outdoor bench will greatly add to the comfort of warm evenings spent in the yard or garden. To make the bench, screw three short lengths of $1\frac{1}{2}$ -in. wrought-iron pipe into a tee fitting. Two of these pipe and tee combinations are then set in concrete a few feet apart as shown in the illustration. When the concrete has set, bolt six lengths of 2x4s to the pipe assemblies to form the seat and the back as indicated.

Glen F. Stillwell, Manhattan Beach, Cal.



Holder Carries Fishhooks Safely

To prevent loose fishhooks from becoming mixed with the contents of the tackle box, make knife cuts in the ends of a short length of garden hose and insert the hooks in these cuts. Lures and flies may also be stored in this manner, and a similar piece of hose may be placed above the grip of the pole to hold extra hooks and flies for the trout and bass fisherman.



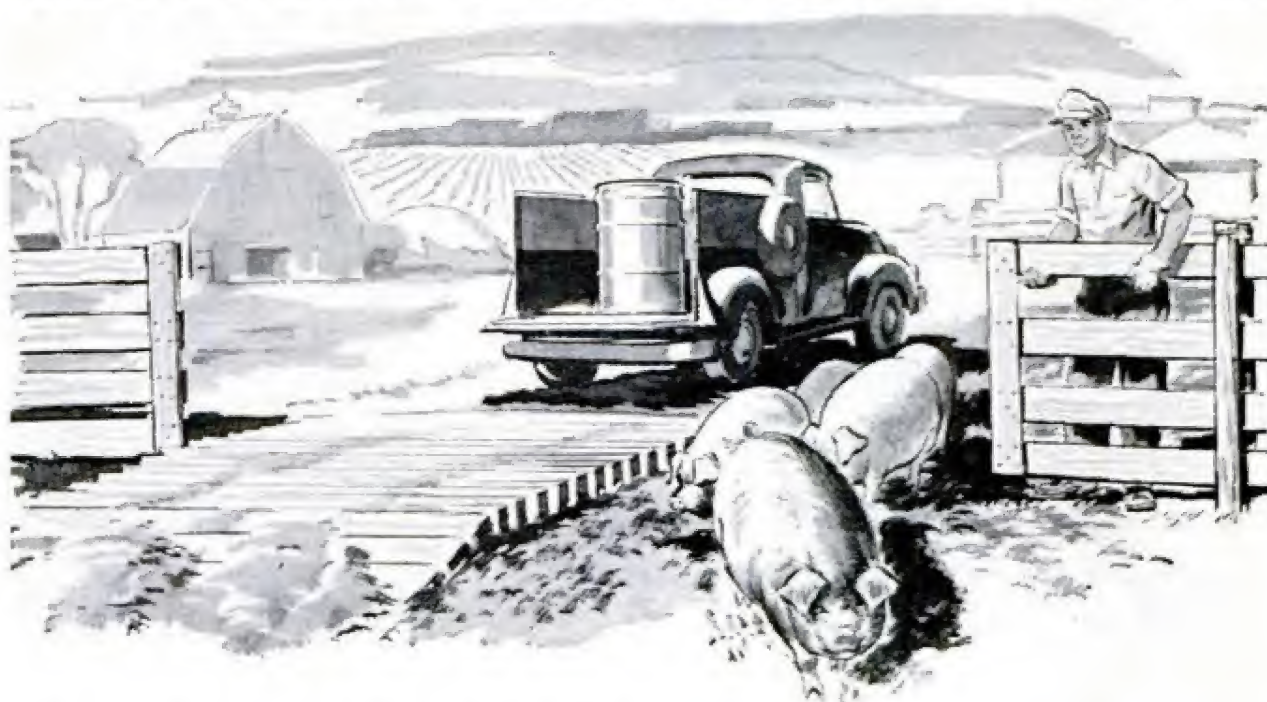
G. E. Hendrickson, Argyle, Wis.

Temporary Dry Rot Repair

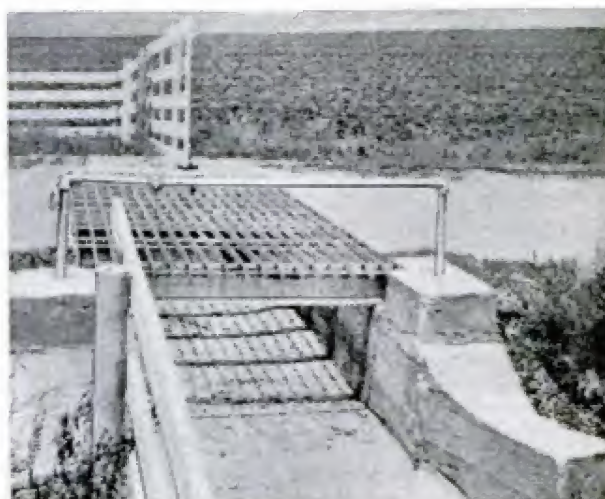
If your boat shows signs of dry rot, here is a way to keep the rot from spreading until permanent repairs can be made. Begin by sanding all paint from the rotted area. Then soak the area with resorcinol-resin glue, allowing the glue to soak in thoroughly. Once it has set, the glue will form a hard, waterproof substance and hold the rot in check. Remember, this is not recommended as a permanent repair, but only as a handy stopgap measure.

Ken Murray, Colon, Mich.

Cattle Guards - Permanent and Portable



To provide himself with the benefits of a cattle guard when hauling feed and water to livestock on temporary pasture, one farmer uses the portable guard shown above. It can be moved to different fences or gateways as needed. It cannot be crossed by the livestock, yet is wide enough to let trucks and tractors pass over it. To allow livestock to pass, the gate is simply swung aside. As a permanent installation, the cattle guard at the right is hard to beat. It is made of flat iron sections welded across a row of I-beams set in concrete. A shallow spillway runs below. A strip of road between the guard and a fence is closed by a gate through which the cattle may be allowed to pass.



Dual Tractor Wheels Double Traction on Soft Ground

Driving a tractor through soft, wet or sandy soil often requires the use of tire chains. Rather than lose time mounting and removing the chains, one farmer equipped his tractor with dual wheels. The added traction allows him to drive the tractor over almost any soil with ease.

In an emergency, a radiator-hose clamp for your tractor can be fashioned quickly from a short length of wire and a bolt and nut. Join the two ends of the wire to form an elongated loop, and twist each end again to form two smaller loops. Wrap the wire around the hose and pass the bolt through the smaller loops. When the nut is threaded on the bolt, the wire will draw tightly around the hose.





After old, cracked putty is removed from window, linseed oil is brushed on exposed edge of wood and glazier's points are pressed into place against the glass to hold it in place until freshly applied putty hardens

TIPS TO KEEP SASH IN TOP SHAPE

By R. Hanscom

AN OUNCE of prevention . . .," certainly applies to the job of keeping window sash in good repair. Unless outside surfaces are maintained in a watertight condition, moisture will enter the wood and rot it. Loose sections of putty are the main source of trouble. Putty in this condition retains water for a long time, creating conditions that are ideal for dry rot when the weather is hot and humid.

The first step in preserving the putty bond is to paint it correctly. The paint line should overlap the glass slightly so that water cannot soak into the relatively porous putty. If the putty line is crooked, this offers an opportunity to make it appear straight. If you have trouble painting a straight line, use masking tape. Loose or cracked putty should be removed to the

bare wood and linseed oil brushed on as in Fig. 1. The latter is an important step, as uncoated wood will absorb much of the oil from fresh putty, leaving it dry and crumbly. Next, glazier's points are pressed into the wood, Fig. 2, after which the new putty is applied.

A window that has been neglected to the point that the mortise-and-tenon joint is partly rotted out, usually can be repaired as shown in Figs. 3, 4, 5 and 6. Begin the repair by sawing off the bad wood as in the drawing next to Fig. 5. To reinforce and help to hold the joint together rigidly, drill a hole through the stile and into the rail to take a dowel as in Figs. 3 and 4. If there is space, drill two such holes, coat the dowels with glue and drive them in place. When the glue has set, saw the dowels flush

Dowel glued in hole drilled in sash corner joint being repaired, reinforces and helps to hold joint together





Rotted wood cut from sash is replaced by new wood cut to fit

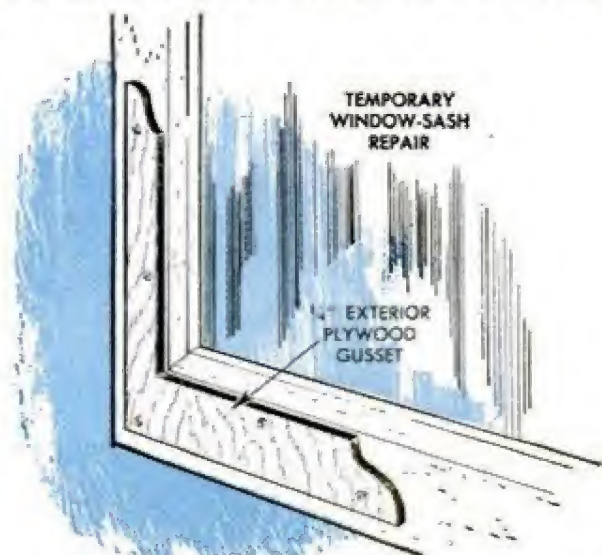
with the stile and cut two pieces of wood to replace the wood that was removed as in Fig. 5. These are then glued and nailed to the sash. Drill pilot holes for the nails and countersink them, being careful not to drive the points through the sash. After the glue sets, the repair area is sanded flush with the old wood. When primed and painted, it will be difficult to detect the repair even from close observation.

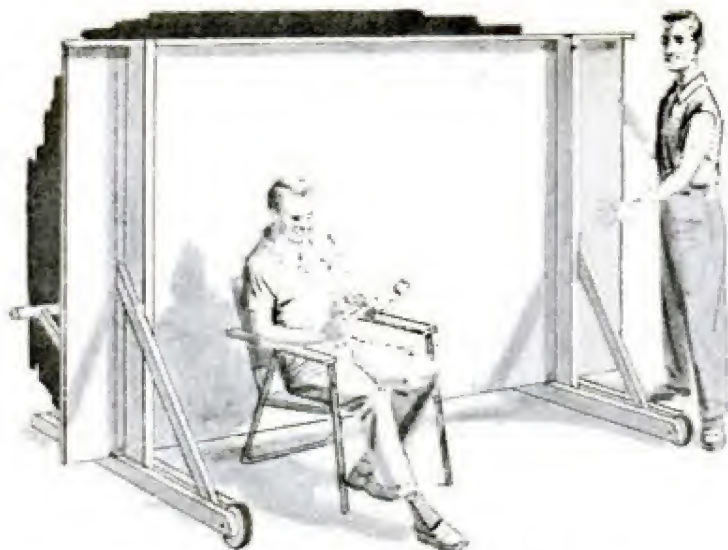
On a porch, garage or attic window, where inside appearance is not important, a rotted or broken sash corner joint can be repaired as shown in the drawing next to Fig. 6. Since this type of repair takes only minutes to make, it is ideal as a temporary repair for sash in any location, until



a permanent repair can be made. All that need be done is cut a $\frac{1}{4}$ -in. plywood gusset and screw it into place as shown, being careful not to position the gusset so as to prevent the window from being closed properly. Double-hung sash that is repaired in this manner should be closed when fastening the gusset. Paint the plywood gusset only if it is to serve as a permanent repair. ★ ★ ★

When sanded flush with old wood of sash, repair area in photo below will be unnoticeable, after painting





Mobile Patio Screen

No garden or patio is complete without this movable wind and sunscreen. The screen consists of a plywood panel mounted on a frame of 2 x 4s. The base, to which wheels are attached, is made by nailing two additional 2 x 4s to the bottom of each of the frame members as shown in the illustration at left. Diagonal supports extend from the frame and fit between the base members. These serve as spreaders and allow space for the wheels. By means of a handle the back is easily lifted and the screen may be wheeled into any desired position.

W. A. Leak, Cupertino, Calif.



Pencil Flashlight Aids In Scale Reading

The figures on machine scales and dials are often difficult to read even in a well-lighted shop. For easier reading and to make settings with greater assurance, provide yourself with extra light. Fasten a small pocket flashlight to a convenient portion of the machine stand or frame. The clip to hold the flashlight can be made by bending a strip of light-gauge metal, and may be fastened with a small nut and bolt, or with a self-tapping screw.

H. Hanscom, Elmhurst, Ill.



Squares Used as Calipers

To measure the diameter of large pipes and ducts, use two squares in the manner shown in the photograph at the left. One square is placed over the pipe and another is aligned along its blade. The diameter of the pipe is read where the two blades intersect. To check for uniformity, the same procedure is repeated several times along the length of the pipe or duct.

Hugh Lineback, Stillwater, Okla.



Pocket-Size Tackle Box

Smooth the way to fishing enjoyment by keeping your fishing lines from getting knotted and tangled with the rest of the tackle. This can be done by using an empty tobacco tin as a pocket-size fishing kit. Insert fishhooks in holes punched along one side of the can and wind the attached lines around it. Spare hooks, lures and sinkers kept inside the can will be available when needed.

G. E. Hendrickson, Argyle, Wis.



Here Is the Way to a Better Wax Job

BEFORE YOU BEGIN to wax a car, there are several things which should be kept in mind. Otherwise, through no amount of effort will you be able to avoid blemishes, streaks, and greasy areas. To begin with, first be sure that the car is clean. If clear water alone will not remove stubborn road film, try a mixture of water and vinegar. Water and washing soda is even more effective and is best for removing accumulations of summer insects from grillwork and windshields. Less abrasive than commercial rubbing compounds, soda is less likely to scratch the paint finish. Remember, allow the car to dry thoroughly before applying wax.

Do not apply wax to a car which has been sitting in the hot sun. Auto waxes are air-drying compounds containing materials which evaporate rapidly. A hot metal surface will greatly accelerate this evapora-

tion and reduce the polishing qualities of the wax. Also be careful in your selection of a wax. The rapid deterioration of a cheap product will make frequent applications necessary and in the long run you will be wasting time and money.

Once the car surface is clean and dry, it is ready to be waxed. A more smooth and even job will be obtained if one small area is polished while the wax on another area is drying. Apply the wax with a damp, clean cloth and in a consistent pattern—either back and forth or with a circular motion. The important thing is to overlap the strokes. In polishing, rub the area vigorously, shaking out the cloth frequently, until a high luster is obtained. Take special care with areas adjacent to door handles and hood ornaments as the total appearance of the finished job will depend largely on little touches such as these.



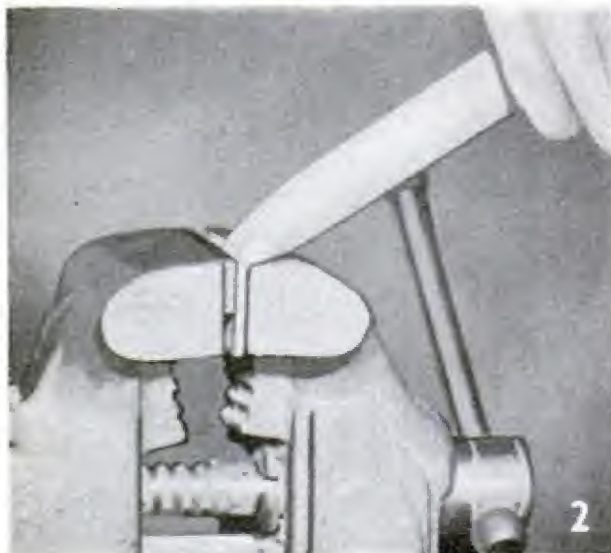


PACK RACK FOR SMALL CARS

By J. M. Rosenthal and R. Edwards



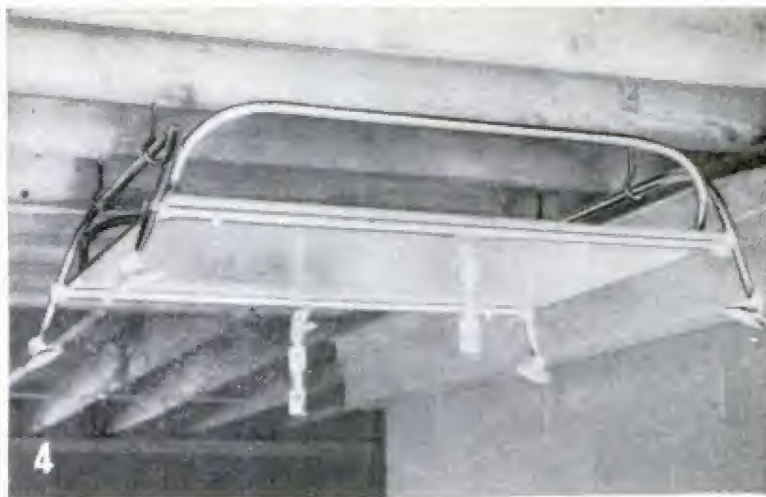
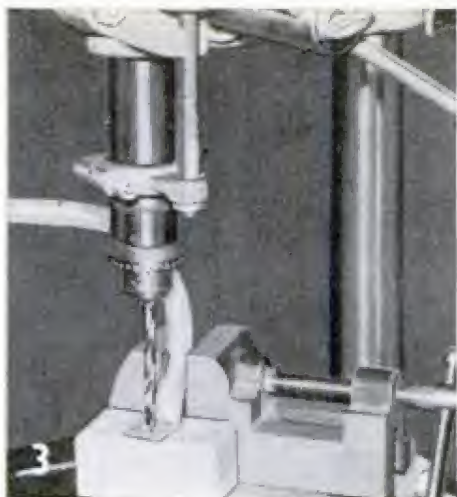
Above, conduit bender makes easy job of forming 90-deg. bend on carrier rail. Below, rail end is flattened and bent to required angle in vise, after which it is drilled to take 1/4-in. mounting bolt



TAKING A family vacation trip in one of the small-small cars is likely to produce a larger dose of "togetherness" than most people will tolerate, unless most of the luggage is carried on a cartop rack like the one shown. Made of lightweight materials, the attractively designed carrier can accommodate several suitcases and some sports equipment. When covered with a waterproof tarpaulin, the luggage is given the same protection from dust and moisture as it would receive in the trunk.

The carrier will fit most foreign and domestic small cars when made according to the dimensions given in Fig. 6. For cars having roofs with high crowns or other unusual roof forms, the dimensions may be changed to suit. Exterior plywood 1/2 in. thick is used for the platform, 1/2-in. thin-wall conduit for the rails and longitudinal supports that go at the sides underneath. Suction cups attached to the flattened ends of the rails hold the carrier in place on the cartop, although a hold-down strap is secured to the gutter on each side as a safety measure.

Side rails are formed from 44-in. lengths of conduit; end rails, from 50-in. lengths. The 90-deg. bends are formed with a con-

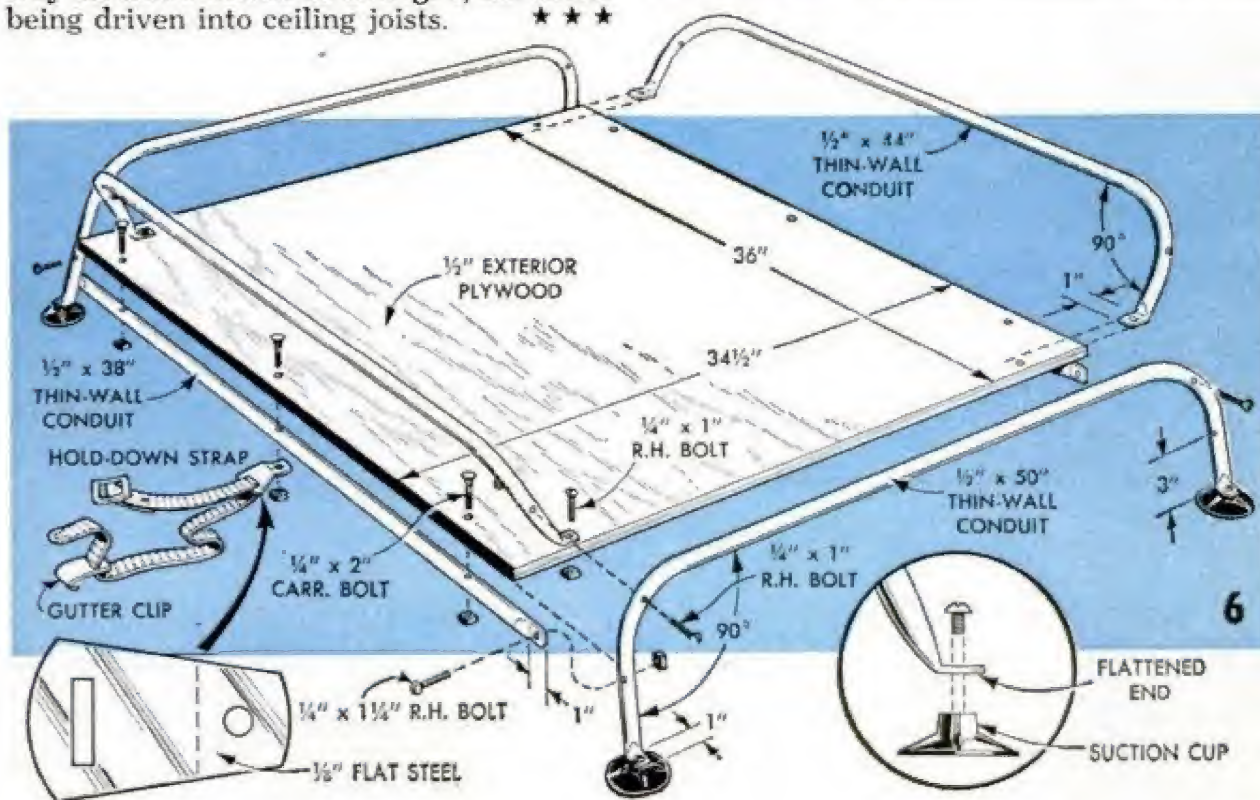
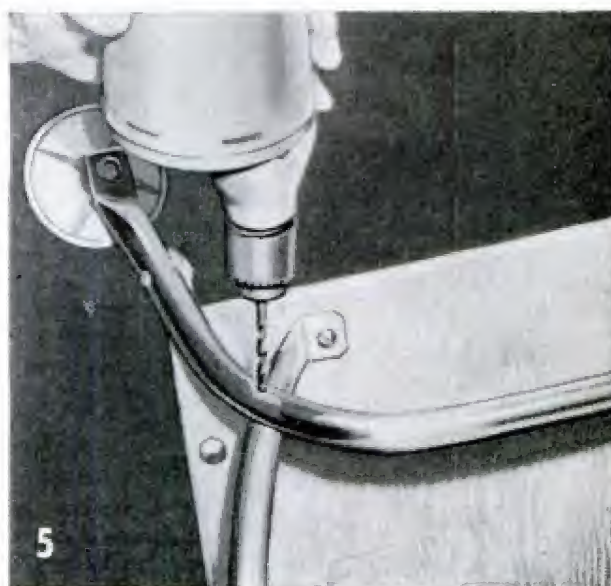


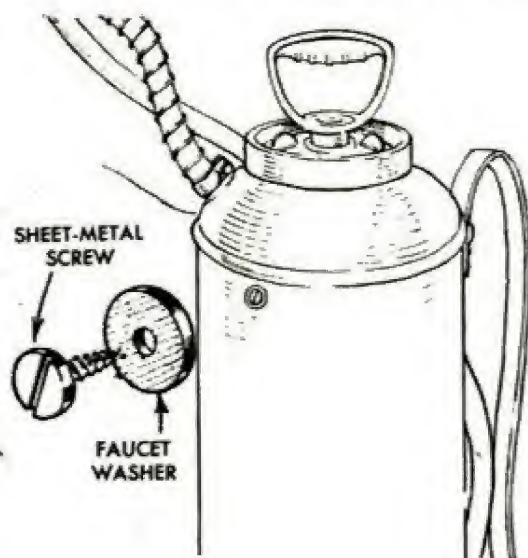
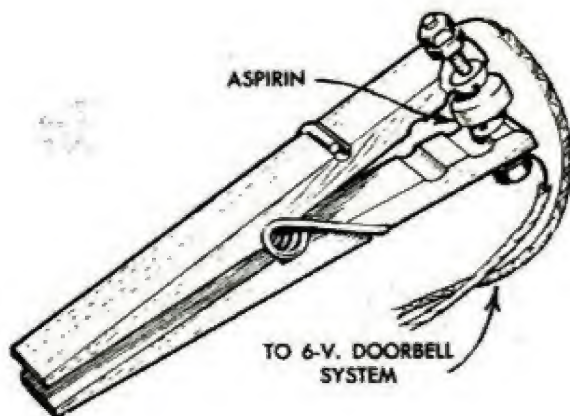
Above left, jig eases job of drilling rail end. Above, carrier stores easily on screw hooks on garage joists

duit bender as in Fig. 1, after which the ends are flattened in a vise, Fig. 2. Be sure the ends are flattened correctly in relation to their mounting position. Unless the curves are shaped by an expert, it's a good idea to cut rail pieces 2 in. longer than needed and then trim the vertical leg portions exactly to the required lengths, after bending them.

After the conduit parts are shaped, bolt holes for the fastenings are drilled. If a jig is used as in Fig. 3, this is an easy job. Holes for bolting the rails together at the corners are drilled after the rails are fastened to the carrier, Fig. 5.

Although the carrier may be painted when it is completely assembled, a better job can be done when it is apart. When not in use, the carrier can be stored out of the way on screw hooks as in Fig. 4, the latter being driven into ceiling joists. ★ ★ ★





—see Aug 60, 144
**Doorbell System Does Double Duty
 As Basement-Flooding Alarm**

Living in an area where seasonal flooding occurs, here is what one homeowner did to alert the household to the threat of a flooded basement. The device consists of a spring-type clothespin, to each jaw of which a brass bolt and a lead to the doorbell is attached as shown. An aspirin tablet holds the lead contacts apart, except when flooding occurs. Then the wetted tablet dissolves, the jaws close and the circuit to the bell is completed. The device is placed next to the floor drain so that the earliest possible warning can be sounded.

**Earthbound Play Spaceship
 Made From Aircraft Drop Tank**

This earthbound rocket for outer-space-minded youngsters was made from a surplus aircraft fuel tank of the drop type, plywood, and miscellaneous switches and instruments of no value, for fake controls. The "ship" is supported in a vertical position, ready for takeoff, by pieces of $\frac{3}{4}$ -in. exterior plywood cut to the shape of flight-control vanes and bolted to the tank sides in the positions shown by means of metal brackets. Inside are two platforms reached by climbing an outside ladder made of 2 x 4s and fitted with handrails which are bent from electrical conduit. Cleats of 2 x 4s nailed to the vanes and bottom of the ladder hold it in place. A short ladder inside connects the two platforms. An impressive-looking panel of controls and instruments is mounted in the "pilot's" compartment. Mounted in the lower end of the tank is an old vacuum sweeper that may be turned on by a toggle switch on the instrument panel. The whine of the vacuum provides an atmosphere of authenticity to impress backyard "space cadets."

**Leak in Garden Sprayer Repaired
 With Screw and Faucet Washer**

To stop a small leak in a compression-type garden sprayer, slip a rubber faucet washer on a sheet-metal screw and drive the latter into the hole so that the washer is forced tight against the tank as indicated in the drawing. For best results, drill the leak hole to the diameter of the screw body, and be careful not to drive the screw so tight as to break the grip of the thread in the hole. If the leak persists, wait until the tank will not be used for a few days and coat the hole area with an all-purpose household cement, refastening the screw and washer as before.

S. N. Stresnic, Ft. Lauderdale, Fla.



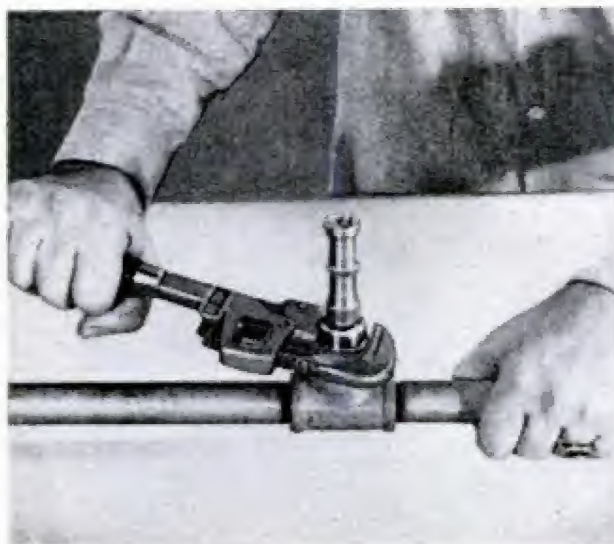
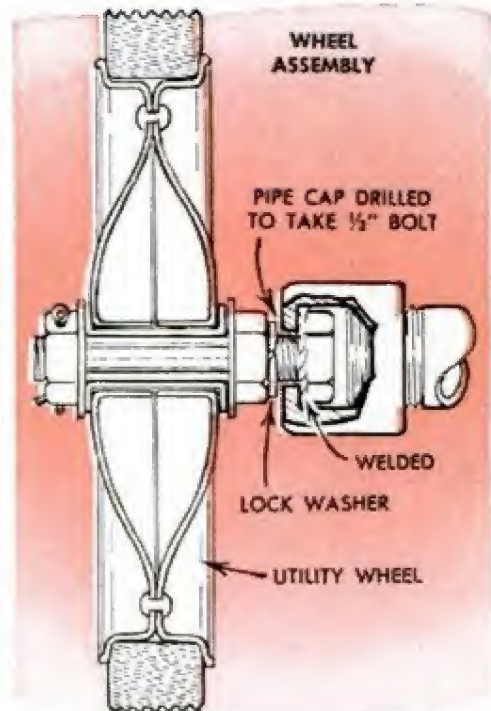
LAWN SPRINKLER CADDY

By Fred Haitz

KEEPING A large lawn watered properly during a "dry spell" is much less of a chore when you have a lawn sprinkler caddy like the one shown. It waters a large section at one time, is easy to move and is made of $\frac{3}{4}$ -in. steel pipe and fittings to which hose nozzles are attached as indicated in the photo, below left. The nozzles permit complete adjustment of spray—from large volume, coarse droplets for quick saturation, to a fine mist that is ideal for watering seedlings and slow soaking.

Each of the caddy wheels is mounted on a bolt welded to an assembly consisting of a pipe cap, nipple and tee fitting installed at one end as in the photo, below right, and the drawing. If two wheels and a shaft are available from a discarded tricycle or coaster wagon, the shaft may be installed in the above assembly instead of welding a bolt to each of the pipe caps as suggested. This will save a welding job. Wheel bearings should be well-greased to prevent corrosion.

When not in use during the watering season, the caddy stores inconspicuously next to a fence or along the edge of a flower bed. For compact winter storage, it may be disassembled into easy-to-handle sections.



Variety in Room

By Enno R. Haan

AS AN important part of modern decor, the room or space divider adds a distinctive touch to any home. In today's quest for gracious living, room dividers have become as various in design and function and in their use of materials as decorative ingenuity can make them. The oriental influence of room dividers is evident in the filigree screen shown at the far left and in those shown below. The floor-to-ceiling type consists of panels of lightweight Philippine mahogany veneer attached to metal poles.



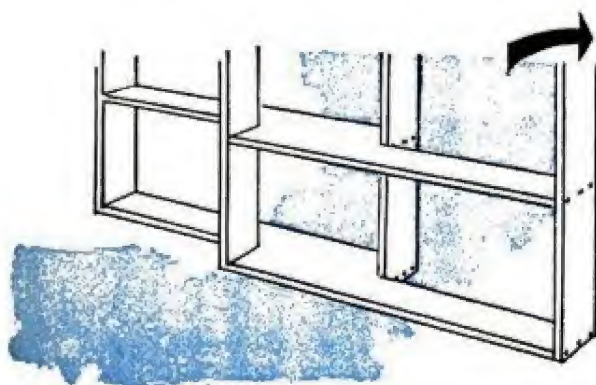
Dividers consisting of poles only, below left, do not obstruct light or vision and may be fitted with plants. Below, a permanent divider in a basement playroom. Metal tubes extend from the base planter to a ceiling canopy fitted with semiconcealed fluorescent lamps

Insulite Div., Minnesota & Ontario Paper Co. photo



Dividers

Another design, pleasing in its simplicity, is the open type divider, right. Easily constructed from 1 x 3-in. wood stock, it may be painted to complement the dominant room color and is particularly effective when only four uprights are used to form three vertical sections of which the center one is the widest. This divider is well suited for doorways and for displaying whatnots and small potted vines. The detail below shows how it is made, 1 x 2s being used for the uprights which are nailed to ten cross members equally spaced.



Similar in pattern to the oriental panels shown on the opposite page, the 14 x 64-in. panel, at the right, may be purchased ready made. Set in a redwood frame, it may be finished to suit individual taste. Several may be joined together with hinges to form a portable divider as shown below. The panels may also be mounted on floor-to-ceiling supports, or hung from the ceiling track, below right. If hung from the ceiling as screens, they may be folded out of the way or extended for use as needed.



St. Charles Mfg. Co. photo

The screens shown below are of the same design as louver-type shutters and are hung from a ceiling track for easy movement. They are joined with folding-screen hinges





Graceful scrollwork panels of cast iron or aluminum are popular for use on patios and porches and offer distinctive possibilities for use as floor-to-ceiling dividers. The cast panels are mounted between square tubular posts. Each unit measures about 13 in. wide and 8 ft. high but may be cut to room dimensions

Many different materials are available for use in room dividers. Corrugated glass fiber, for instance, is particularly striking and is ideal for dividing the cooking area from the dining area. These panels are held by matching wood strips. Spring-loaded supports, right, wedge the panels between the floor and ceiling and permit the panels to be turned to increase or cut down on the amount of air circulation

PERFORATED
SHEET METAL

METAL
OR PLASTIC
MESH

CORRUGATED
GLASS FIBER



SUCTION CUP
TWO
TELESCOPING
TUBES

HARDBOARD

PERFORATED
HARDBOARD

SPRING

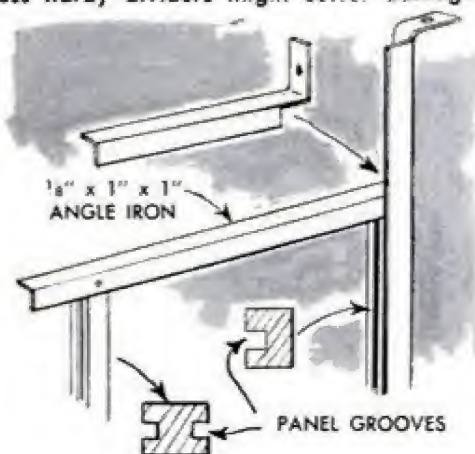
SLOT

SCREW

RUBBER
TIP

TIGHT
FIT
THREE
TELESCOPING TUBES
PERMIT TURNING
AND UP-AND-DOWN
MOVEMENT

Room divider panels, right, can be held in angle-iron frames whose ends are bent to allow attachment. Detail below shows the joint between vertical and horizontal members and the grooved wood strips which hold the panels. Strong and durable, dividers of this kind are best used as permanent fixtures and are especially useful in connection with rumpus rooms where less hardy dividers might suffer damage



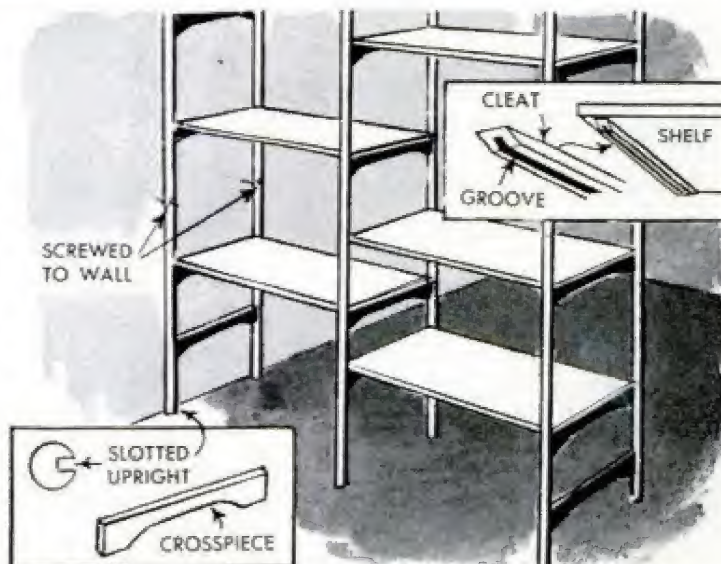
Westinghouse Electric Corp. photo

Common everyday materials offer the imaginative decorator an opportunity to give his home an artistic touch at little cost. Sheets of translucent plastic, above right, not only divide one area from another but diffuse the lights from adjoining rooms



Chicken-wire netting also may be used, as at the right. In this case, the netting was pulled over the top of the aluminum tubing frame and attached to a crosspiece near the bottom. The bottom ends of the frame fit into holes in the planter base. Climbing flowers or ivy planted in the base planter will in a short time create a screen of flowers or green leaves

Delicate display shelf units like those illustrated at the right serve as shelves and also double as room dividers. Details show how such a unit can be changed in size and appearance through the use of its slotted cleats and crosspieces. The cleats slip snugly over the crosspieces of the "ladders" and hold the assembly together as a unit. One set of uprights must be screwed to the wall for rigidity





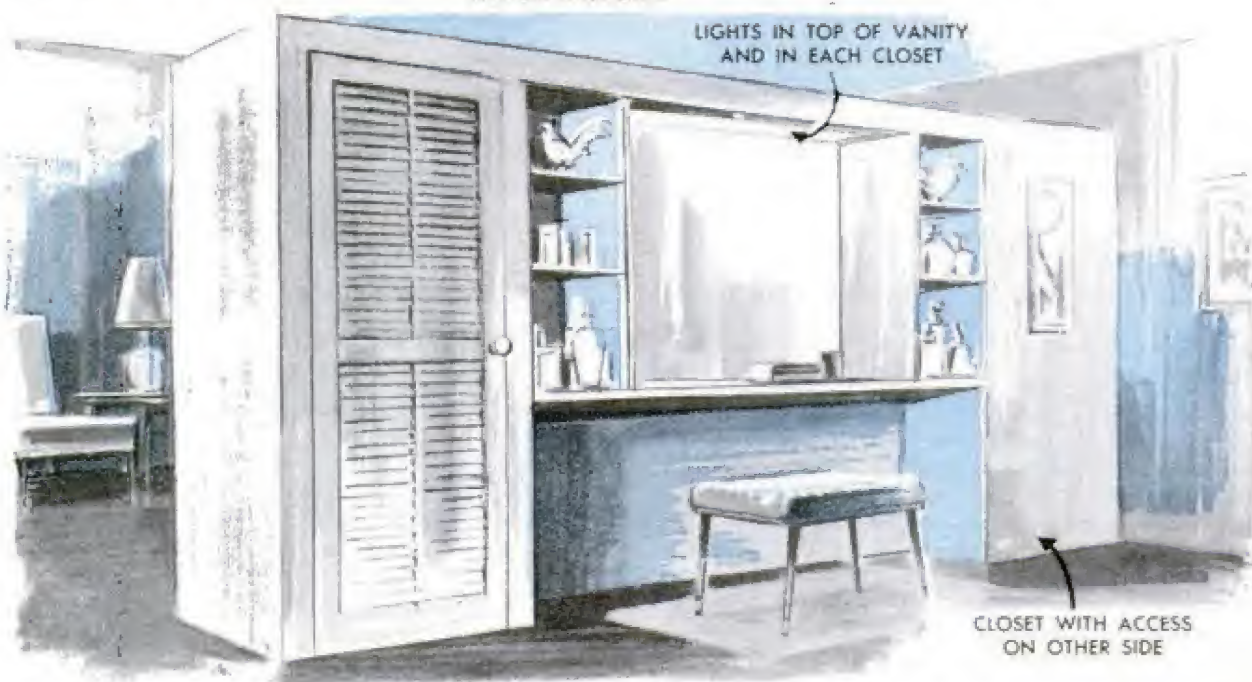
Dividing a large combination living-dining area, this multi-purpose plywood cabinet and shelf unit provides storage space and shelf space for books and magazines. It is complete with a clock and a phonograph and houses two television sets. The floor-level planter gives the rooms a garden motif



Cabinet-type room dividers, like the one shown on the left, transform a single large bedroom into two smaller sleeping quarters, providing extra privacy for growing children. The divider may be made to cross the room entirely if each area has a separate exit to the hall. This design is particularly valuable where extra storage space is needed

Below is another design in room dividers intended primarily for use by teen-agers. The closets, not less than 2 ft. deep and 3 ft. wide, are accessible from opposite sides. One side of the center portion may be fitted with a vanity mirror, table, drawers and extra shelves. The other side may be arranged in the same way or in any other fashion suiting the taste of the occupant of the room

Masonite Corp. photo





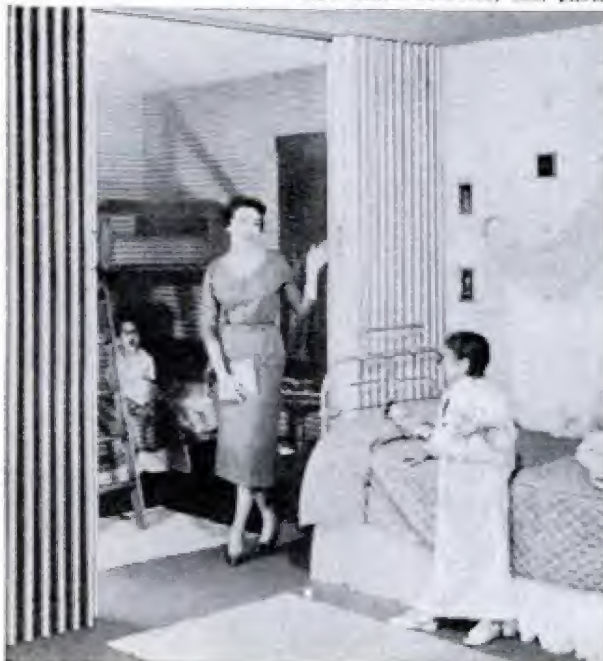
Woodall Industries, Inc. photo

Sliding walls, such as that shown above, may be made of glass or wood to permit a more positive separation than is possible with open grillwork or with cabinets that divide only part of the room. Sliding doors open up the home to large numbers of guests, or close to afford maximum privacy to individuals. Since doors of this kind are made of single panels, there is little to do in the way of construction. Steel or aluminum tracks are screwed to the floor and ceiling and guides are screwed to the panels. Once mounted, the panel may be finished with each side complementing the color of the room it faces

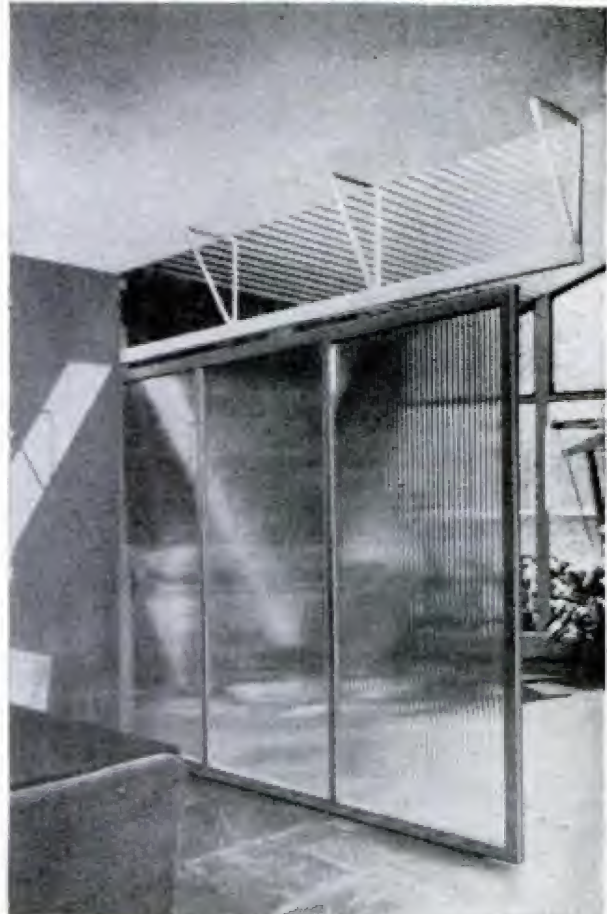
Another example of a sliding wall is shown at the right below. The frames of this divider are made of sturdy oak and the panels are translucent frosted glass. The entire assembly slides easily on a track fitted into the bottom of a special framework suspended from the ceiling. The opening between the ceiling and the divider assures a continuous circulation of air; is best for areas around swimming pools

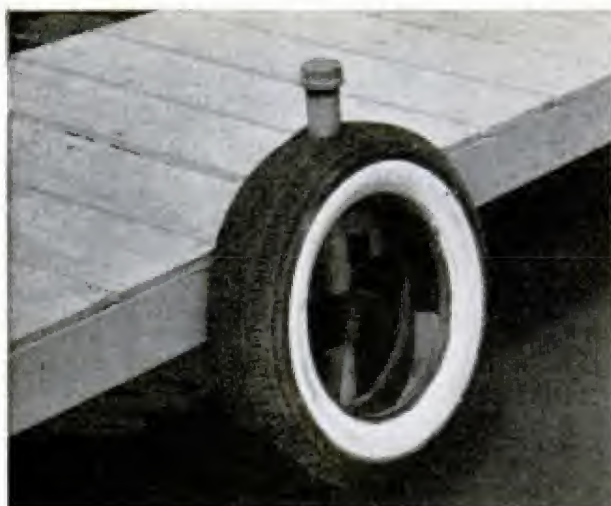
Dividers of the folding, or accordion type, shown below, have a sturdy metal frame covered with a strong and durable fabric. They require very little space when open and may even be fitted into wall recesses and be completely concealed from view. The overhead track on which they run is easy to install in any existing home. This type is especially useful in smaller homes where portions of rooms, such as a bedroom doubling as a nursery, must be closed off during certain times of the day from other rooms

New Castle Products, Inc. photo



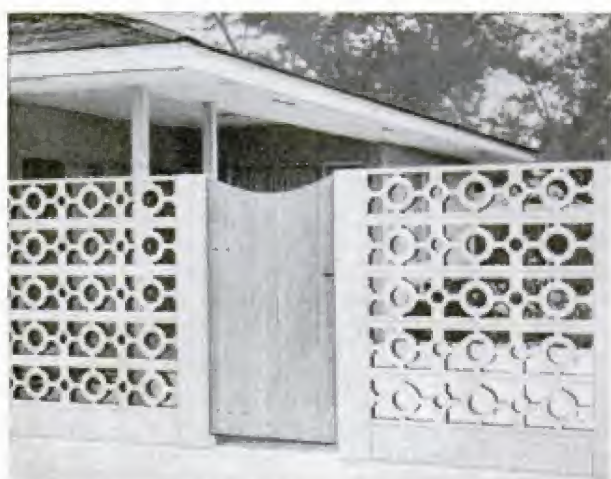
Libbey-Owens-Ford Glass Co. photo





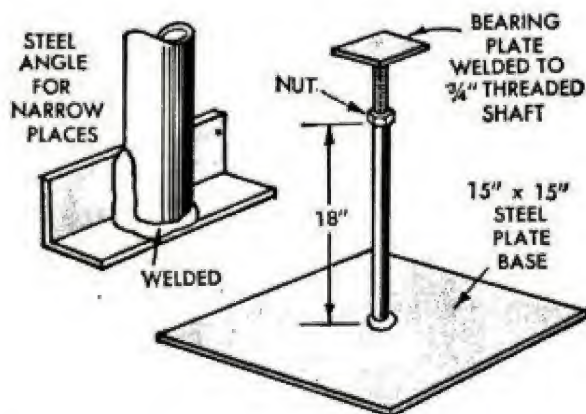
Pipe Cap Locks Tire on Dock Post

To protect the topsides of my new boat and dock as well, I collected enough discarded whitewall tires for the steel-pipe posts on the dock and installed them as shown. A slightly undersize hole was cut in the tread of each tire to take the post, making it difficult for trespassers to remove them without unscrewing the pipe cap. The tight fit also helps to keep the tires in place. Most metal and glass fiber boats do not become marked from contact with the tires, which remain serviceable for many seasons.—R. Amati, Chicago



Decorative Concrete-Block Screen

This attractive concrete-block screen wall provides semiprivacy without stopping summer breezes. Available in other designs that are equally open, many patterns can be worked out in such a wall by combining the decorative blocks with solid ones. For a strong vertical accent, space columns of solid blocks fairly close together. A row of solid blocks at the bottom and top of a wall will give it a horizontal accent. Other basic patterns, such as squares, diagonals and checkerboard are easy to make. Use standard concrete-block mortar for all joints.



Heavy-Duty Support Jack

Make your own heavy-duty jack when one is needed for raising a sagging corner of a garage, or for a permanent support that should be fully adjustable. The drawing at left shows you how to make such a jack at a fraction of the cost of manufactured ones. Lifting action is obtained by turning a nut on a threaded shaft, the former of which bears against the upper end of a pipe length welded to a base. A broad steel base is best for use on soft ground; a steel-angle base when a jack is to be used in a narrow place.

J. A. Lockhart, Bryan, Ohio



Painted "On" Face of Switch Serves as "Pilot Light"

When a switch is located where it is difficult to observe whether the light it operates is "on" or "off," such as a basement or attic light, here is a way of telling at a glance. Simply enamel the "on" face of the toggle in white or some other color that will give maximum contrast with the color of the switch plate as indicated in the photo at left. Use reflective tape, if the switch is located in a service area that is quite dark most of the time.

Henry Hanscom, Elmhurst, Ill.

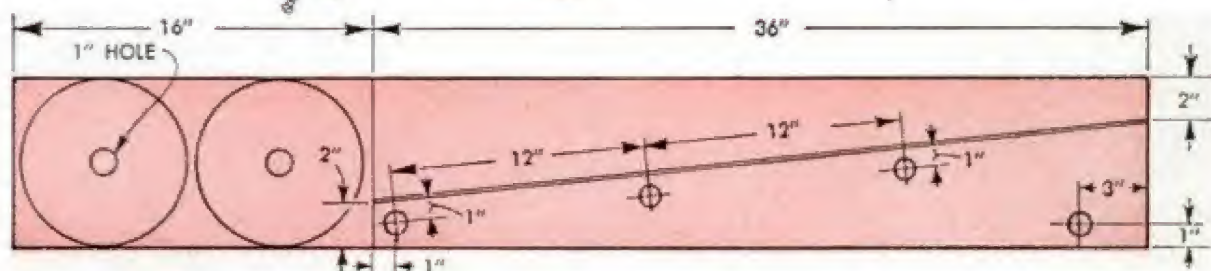
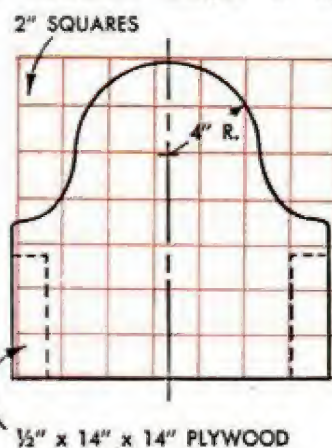
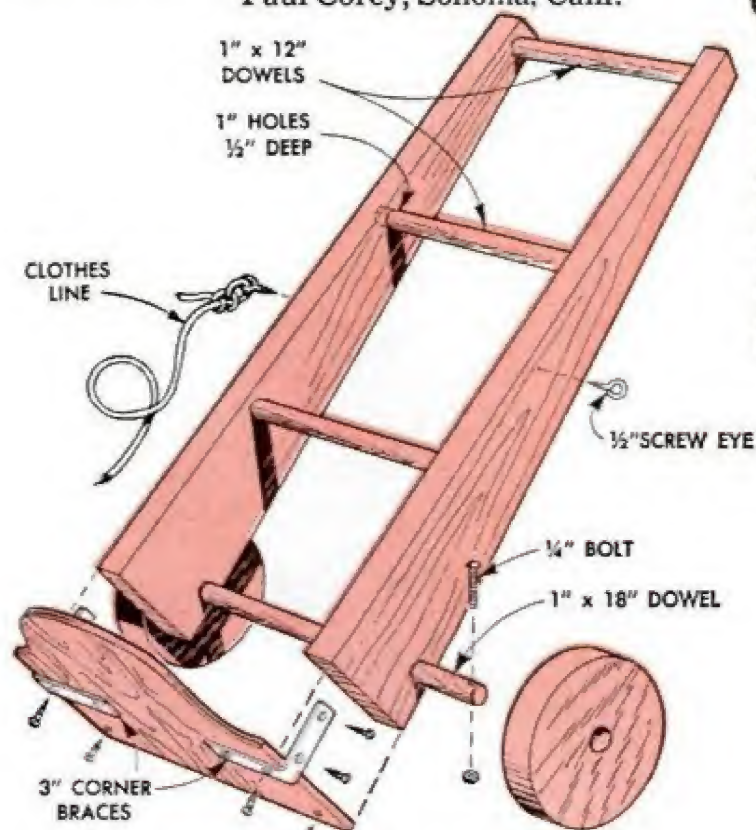
Homemade Hand Truck Eases Moving Chores

KNOWING THE proper way to lift heavy objects is not sure proof against a strained back. Younger men are more likely to attempt heavy jobs and fall victim to kinks and strains as often as their older friends. This useful hand truck eliminates such mishaps. It is useful in man-sized jobs, such as moving trash cans and sacks of cement, and can be used by the little woman in the garden and the house. The frame and wheels are cut from a piece of 2 x 8 x 52-in. fir, 36 in. of which are used for the frame. The wood is ripped along a diagonal line as shown in the illustration. Drill a series of blind holes in each piece and mount and glue the frame sections on 1-in. dowels or sections of broom handle. Cut the wheels from the remaining 16-in. of fir. An 18-in. dowel run through a hole bored in the frame and in the center of each wheel serves as an axle. The platform is cut from 1/2-in. plywood in the shape illustrated, and is fastened to the frame with screws, glue and 3-in. corner braces.

Paul Corey, Sonoma, Calif.



Though light in weight, the truck handles an amazing variety of heavy jobs. Its small size not only makes it convenient to store, but allows it to be used by women and children in home and garden chores, and for hauling heavy stock and scrap in the shop. For bulky objects, such as potted shrubs and plants, a screw eye and rope combination across the front secures the load and eliminates danger of tipping



DUAL-PURPOSE SKI ROPE

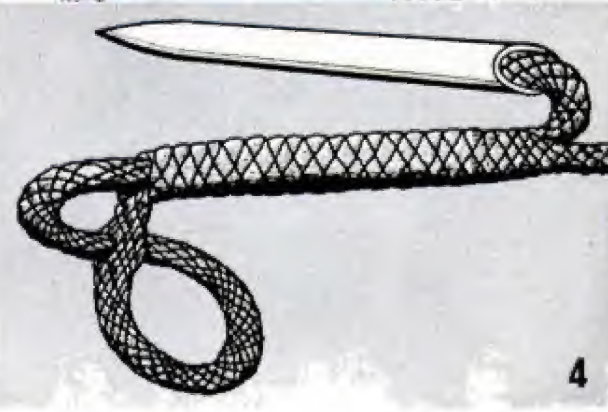


FOR THE WATER SKIER who likes to do slalom skiing as well as the regular variety, here is a ski rope that has quick-change single and double handles, eliminating the need for two complete ropes. You can make the rope in less than an hour. Cost, about five dollars, if you make the handles yourself instead of using patented aluminum ones popular now.

The quick-change feature is provided by a new type of patented hook that is used in pairs as in Fig. 9. One is attached to the outboard end of the main part of the ski rope and another is attached to each of the handle ropes (single and slalom). The handle desired then may be connected to

the rope in a second by engaging the eye of one hook with the other as in Fig. 5.

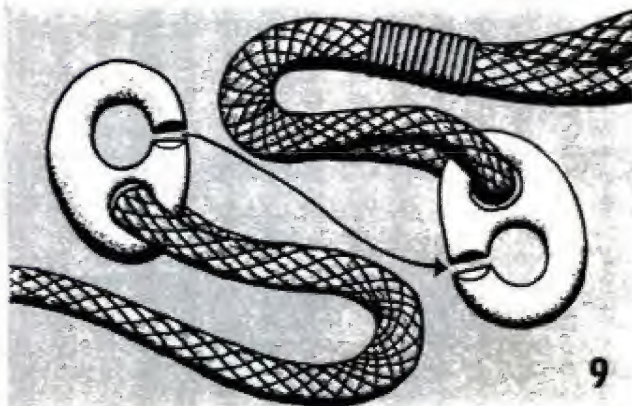
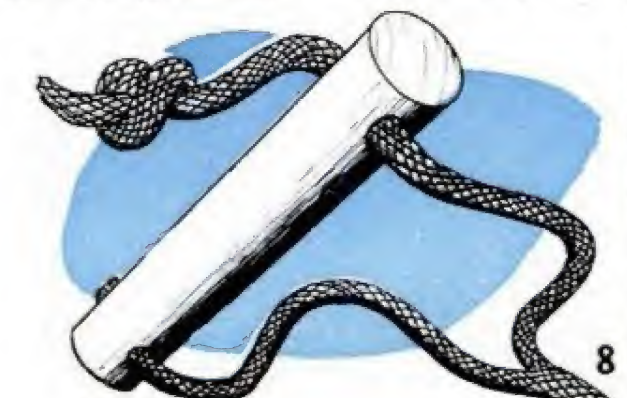
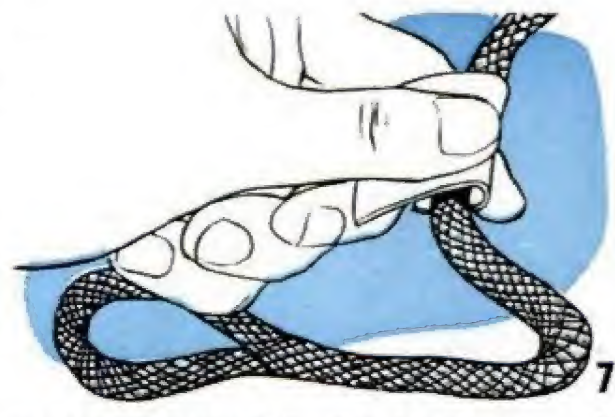
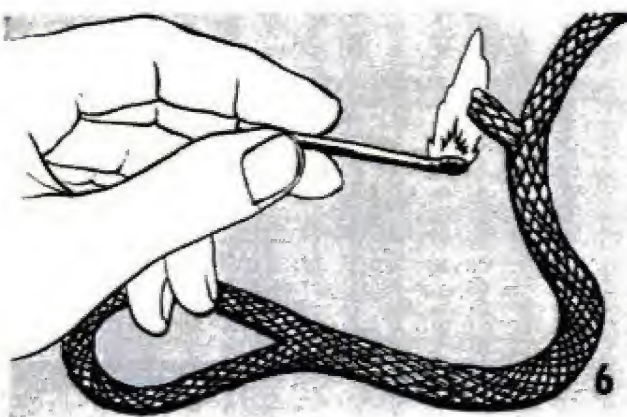
The materials needed for the rope are available at most marine-supply stores, except for the 1-in. ash dowel stock from which the handles are cut and drilled, Fig. 8. A 100-ft. length of braided $\frac{1}{4}$ -in. plastic ski rope is required, from which the following lengths are cut (finished lengths of each section are given in parenthesis). Main section, 76 ft. (75 ft.); single handle rope, 2½ ft. (11 in.); center, connecting section for slalom rig, 17 ft. (8 ft.); rope for slalom handles, 2 ft. each (9 in.). The above includes an allowance of 6 in. for eye splices where required. A small plastic





float attached as shown, provides flotation for the metal hooks.

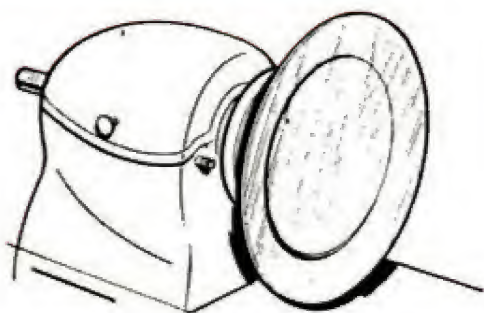
Forming the eye splices at both ends of the main part of the rope and at the ends of the center slalom section is an easy job as shown in the drawings. The hollow fid used for passing the rope end between the strands and through the hollow core can be made by shaping a short length of copper tubing to a point. The flame of a match is touched to the rope end of a completed eye splice to fuse the strands, after which it is pressed into the rope with cardboard, Figs. 6 and 7. The hook is held in place on the center slalom section by whipping the doubled rope as in Figs. 5 and 9. ★ ★ ★



SHOP NOTES

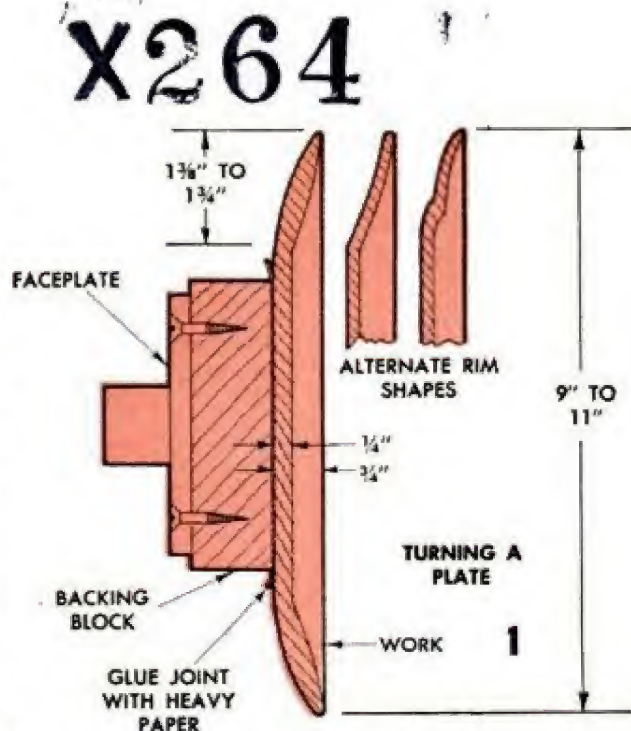
FACEPLATE TURNING

By Sam Brown



NO FORM OF wood turning gives as much enjoyment and satisfaction as the turning of a cylindrical box, bowl or platter in select cabinet woods. Projects of this kind take two to four hours to complete from start to finish, and require little skill — only a little muscle and patience. Hard, white maple is the recommended first choice in readily-obtainable woods, and a single plate or platter about 11 in. in diameter is a good first project. Preferably the wood should be one piece, but stock with a single waterproof glue joint is satisfactory.

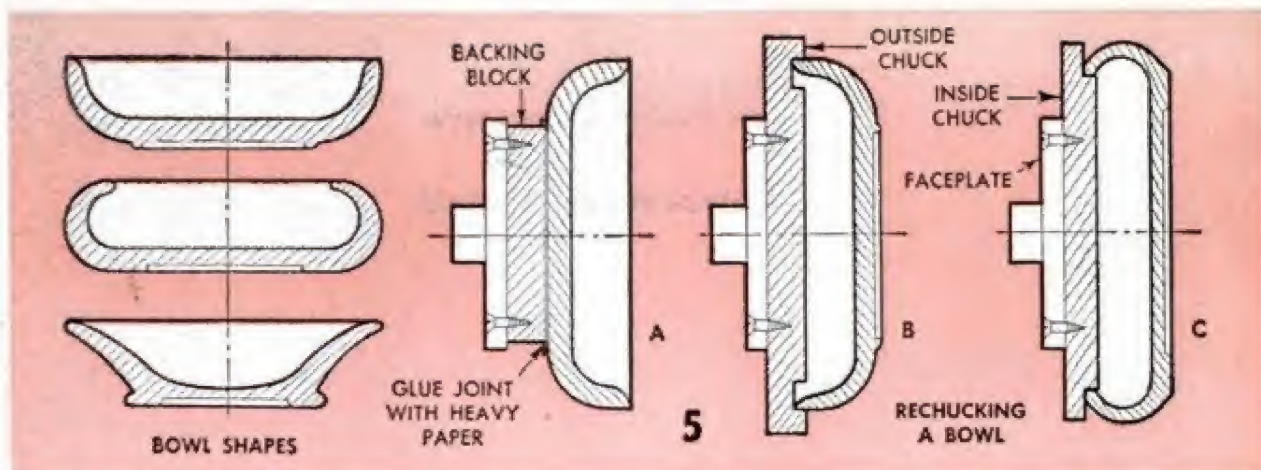
Work is mounted as shown in Fig. 1. The backing block is screw-fastened to the lathe faceplate and is turned on the outer face to form a true flat surface. The work stock is glued to the backing with



a disk of glazed paper at the joint. The slick paper used for magazine covers is excellent. Coat both sides of the paper disk with glue and then clamp the assembly with C-clamps. It also is practical to use the lathe itself for clamping by bringing up the tailstock to press against the wood.

Turning is just a matter of scraping, using any chisel that fits the shape of the wood surface. The most important point is to keep chisels sharp—light honing every 10 or 15 min. is required for

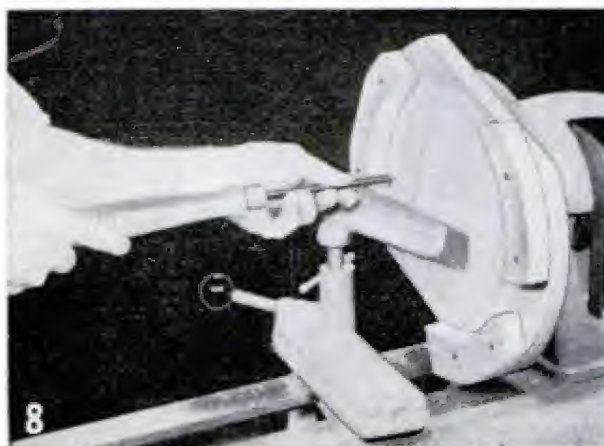
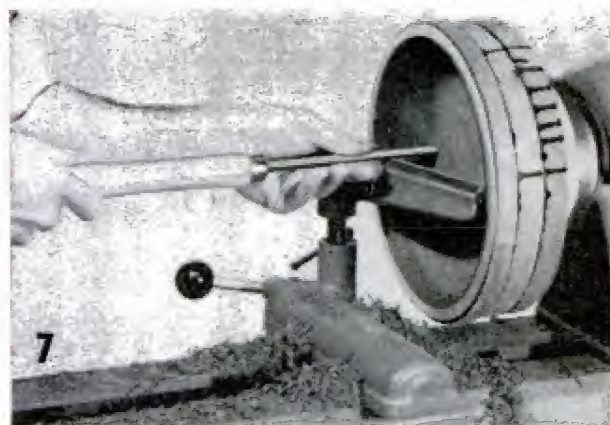


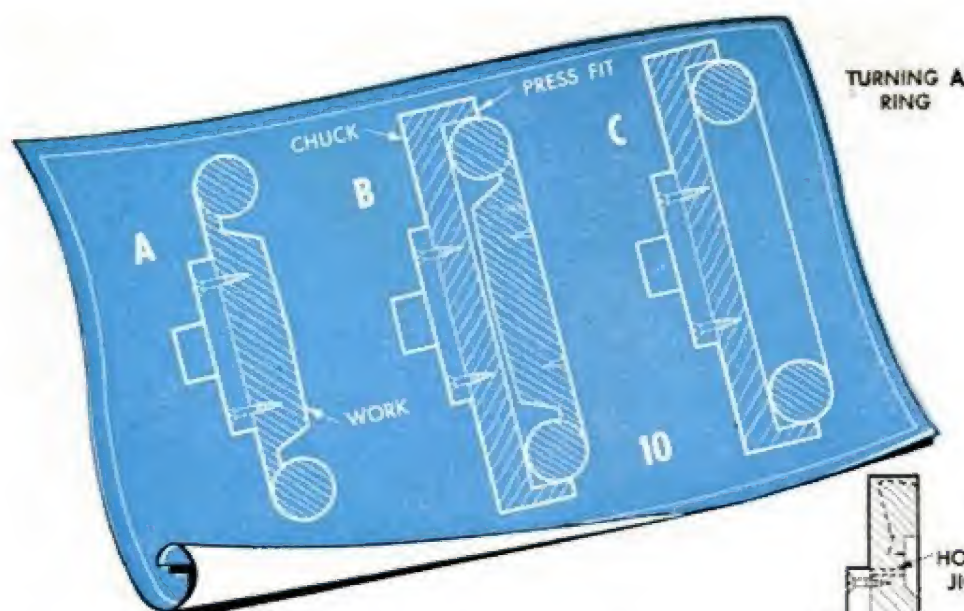


clean, fast cutting. A large gouge usually is used for roughing cuts, while lighter finishing cuts can be taken with a round-nose chisel. The main secret of chisel technique is to pick up a "bite" and hold it, moving the chisel slowly across the work. Very light cuts with flat or round-nose chisels are needed, Fig. 2, and at least $\frac{1}{16}$ in. of wood must be removed in this manner to obtain smoothness in the two cross-grained areas present in every turning. Final sanding with 3/0 garnet abrasive will remove minor humps and hollows. The lathe should run at slowest speed, or about 600 r.p.m. for roughing, while second speed (about 1200 r.p.m.) can be used for finishing cuts and sanding, but only if you feel comfortable with the work turning at this higher

speed. For a flat-bottom plate, all of the turning can be completed in one chucking. Fig. 3 shows the back being turned. After turning is completed, you can remove the plate from the back block by driving a sharp wood chisel into the papered glue joint. The glue itself will hold tightly to the wood—but the paper will split, as can be seen in Fig. 4. The flat bottom is finished by hand-scraping and sanding.

Sometimes you may wish to turn the bottom of a plate or bowl. In this case, the work must be rechucked. This is done by turning a disk of wood to form a recessed chuck into which the half-finished work can be press-fitted as indicated in Fig. 5. Details A, B and C show chucks for bowls of the three most common

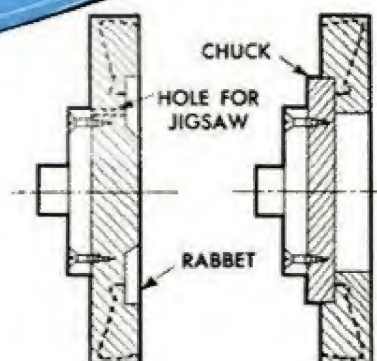




shapes. Wooden "jaws" nailed to a flat piece of plywood often are used, Fig. 8, instead of a one-piece solid chuck. Fig. 9 shows the bottom of the bowl being turned. Bowls always require thick wood. The needed thickness often is built up from thinner wood, always with an uneven number of layers, and usually with the grain running the same way in all pieces, Figs. 6 and 7. Rough stock for glue jointing need be surfaced only around the rim, a job which can be done by turning or with a planer head in the drill press.

Similar work operations are used in turning a ring or making a round, rabbeted frame, Figs. 10 to 14. Fig. 10 shows the steps in turning a ring. The first operation is done on a faceplate, detail A,

11 RABBETED FRAME



after which the partly completed work is held in a wooden chuck, detail B, to complete removal of the waste stock, detail C. Steps in turning a rabbeted frame are given in Fig. 11, starting with a faceplate and finishing the frame on a special wooden chuck.

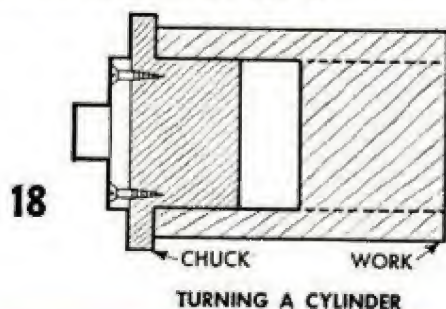
Often in plate and platter turning, the work will be too large to swing over the lathe bed and must then be worked on the outboard end of the headstock



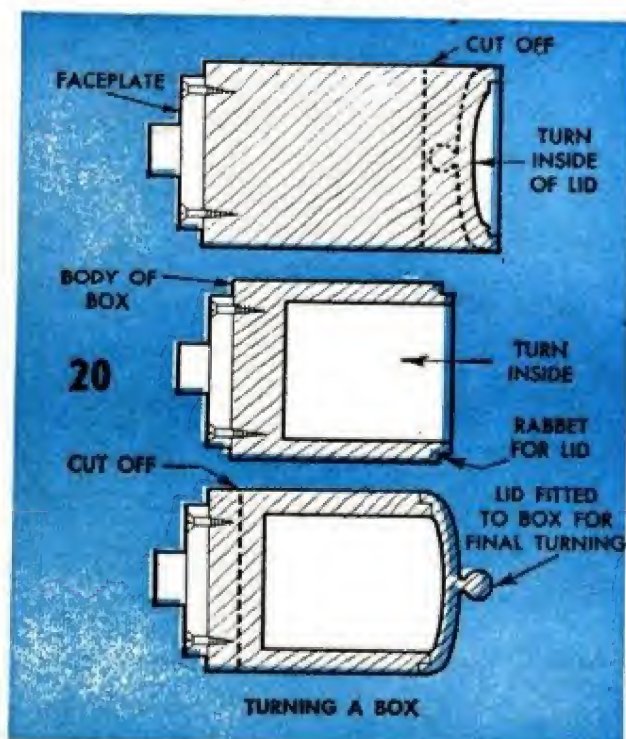
spindle with the aid of a floorstand tool rest, Fig. 15. If you don't have a floor stand, use a tool rest, or a wood or metal support, clamped to the table of a floor-model drill press as in Fig. 16.

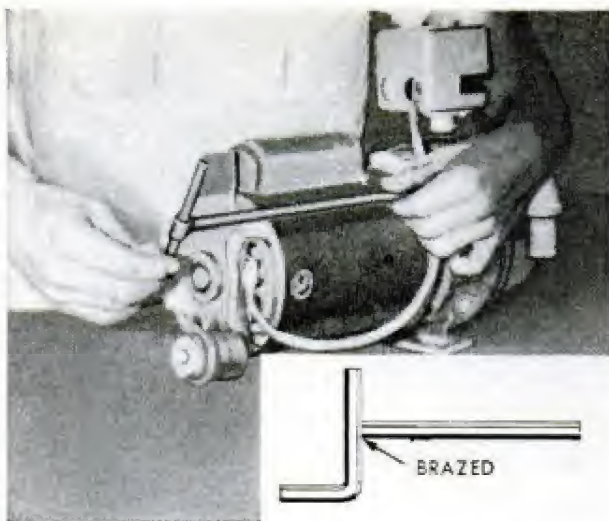
When turning a cylinder-shaped box, the work itself provides a chuck for re-chucking the lid. Figs. 17 through 20 give the details. The lid often is worked on the same length of stock, but may be worked up from a separate length of wood if desired. A hollow cylinder is turned very much like a box but, if over 3 in. long, is usually rechucked to permit turning from the opposite end as shown in Figs. 18 and 19.

The fastest, easiest finish for faceplate projects is done with two coats of penetrating floor finish. This material is a phenolic resin and the finish is "in" the wood rather than on the surface. The finish is applied by brush or cloth, Fig. 21, and wiped clean in 15 to 20 min., no longer, and a second coat is similarly applied in about 8 hours, each coat being sanded down lightly and the final coat dulled by rubbing compound. For the more conventional "on the surface" finish, nothing beats three or four coats of water-white lacquer applied by spray. ★ ★ ★



TURNING A CYLINDER

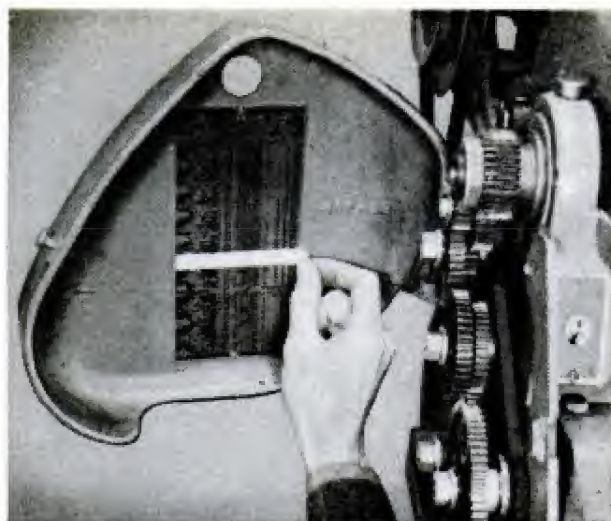




Socket-Head Wrench and Rod Make Efficient Speed Wrench

Caught without a speed wrench? A good substitute can be worked up with little time and effort by brazing a regular socket-head wrench to a suitable length of hex rod. This makes a T-handled speed wrench which will enable you to reach those otherwise inaccessible screws.

Harry J. Miller, Sarasota, Fla.



Tape Indicates Setting Of Lathe Gear Train

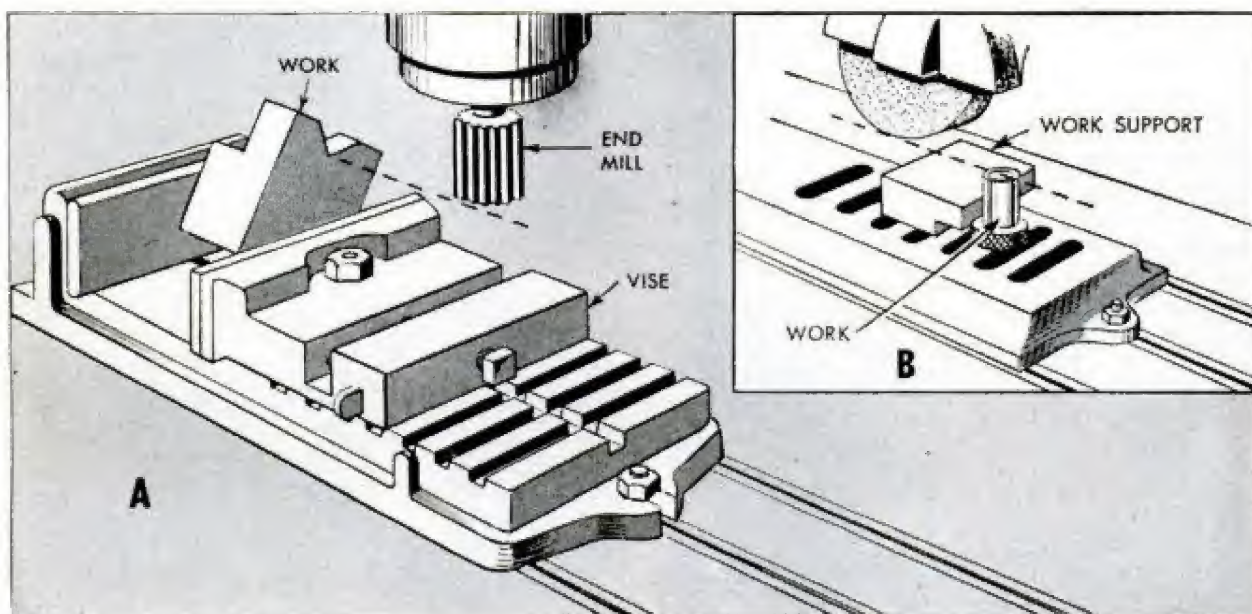
When setting up the gear train on a lathe, it may prove convenient to place a piece of adhesive tape under the appropriate setting listed on the threading chart. In this manner, persons who do not know what the current setting is can find out at a glance, and changes in the setting can be indicated by moving the tape.

Fixture Holds Drill Bushing Securely on Grinder

Although most drill bushings come in standard lengths, a toolmaker may find it convenient to grind from .010 to .015 in. from the bushing's total length so that it will fit a jig plate. To do this without having the bushing tip or slip on the surface grinder, a simple fixture can be made which will hold bushings of various sizes. First select a piece of steel and machine a clearance to accommodate the head of

the bushing, as shown in illustration B, below. Then make two cuts in the steel at 45-deg. angles. This will produce a notch with a total angle of 90 deg. To use the fixture, set it on the magnetic chuck with the shank of the bushing bearing against the notch. As the grinder moves over the top of the bushing, the fixture will hold it and keep it from tipping.

Frank La Saracina, New York, N. Y.



Socket Ratchet Converted To Offset Screwdriver

To make an offset screwdriver, fit a flat steel blade into the socket of a ratchet wrench and fit the socket into its handle, as shown in the photograph at the right. The blade must be wide enough to press fit into the socket head so that it remains firmly in position even under considerable pressure. A blade of almost any length may be chosen, depending on the nature of the job to be done, though for close work a short blade may be preferred.

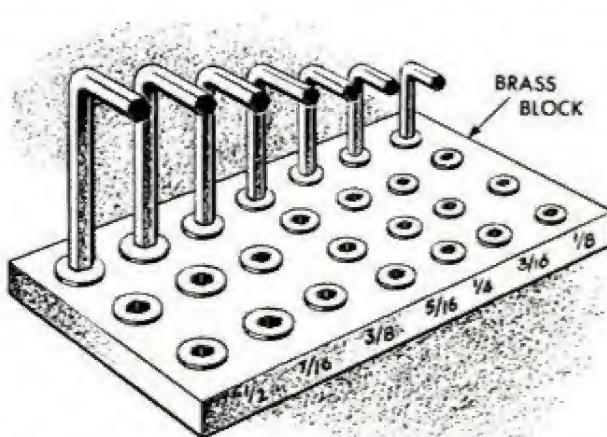
R. Hanscom, Elmhurst, Ill.



Socket-Head Wrenches Stored In Metal Bench-Top Holder

With a brass block drilled and tapped to accommodate several different sizes of socket-head screws, fumbling and searching for the right size wrench is made a thing of the past. Each screw serves as a holder for a wrench of a particular size as shown in the illustration at right. Thus, the wrenches are sorted and ready to be selected as needed. By drilling additional holes, spare screws are also sorted and available for use.

S. Clark, East Bradenton, Fla.



Coating of Rubber Cement Keeps Tools Rust-Free

Metal tools which are to be stored for a good length of time can be protected from rust by coating them with rubber cement. The cement dries in a few minutes and affords a moistureproof seal. An added advantage is that the tools can be stored almost immediately without the need for special wrapping, as is the case where oil is used as a preservative. When the equipment is again needed the cement can be rubbed off quickly, leaving a clean, rust-free surface.

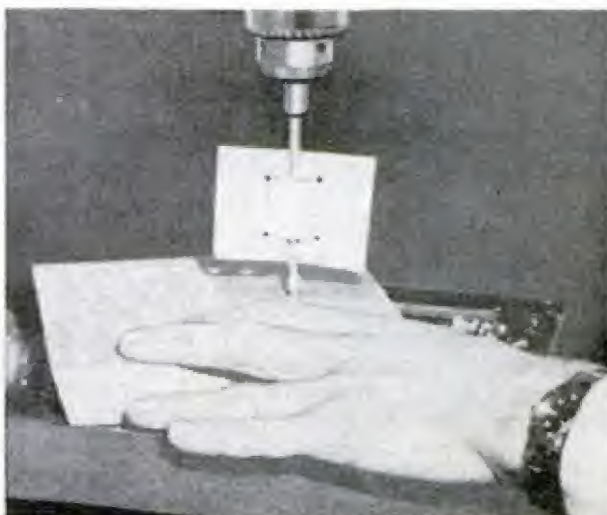


Cardboard on Drill Bit Clears Away Shavings

It is not hard to keep a workpiece and drillpress table free of shavings if a piece of cardboard is cut and slipped over the drill bit as shown in the photograph at the right. This method is effective and quite safe. Should your hand touch it, the cardboard will merely stop spinning.

Wayne Judy, International Falls, Minn.

When painting a window sash, be careful not to get paint on the weather stripping or on the track. If you do, the sash will be hard to move. Clean the track with fine steel wool and give it a coat of paraffin or boiled linseed oil.



On the MARKET

for Do-It-Yourselfers



1



2

1. SEALER PROTECTS CONCRETE floors and driveways against damage by the calcium chloride and salt residues which are carried onto the driveways and floors by cars during the winter months. This sealer is designed to guard against the pitting and dusting of the concrete surface caused by the salty slush. It's in liquid form and can be applied with a brush, squeegee, roller or sprayer. Two coats give maximum protection against salt residues and the dirt and dusts that seem to work their way right into unprotected concrete.

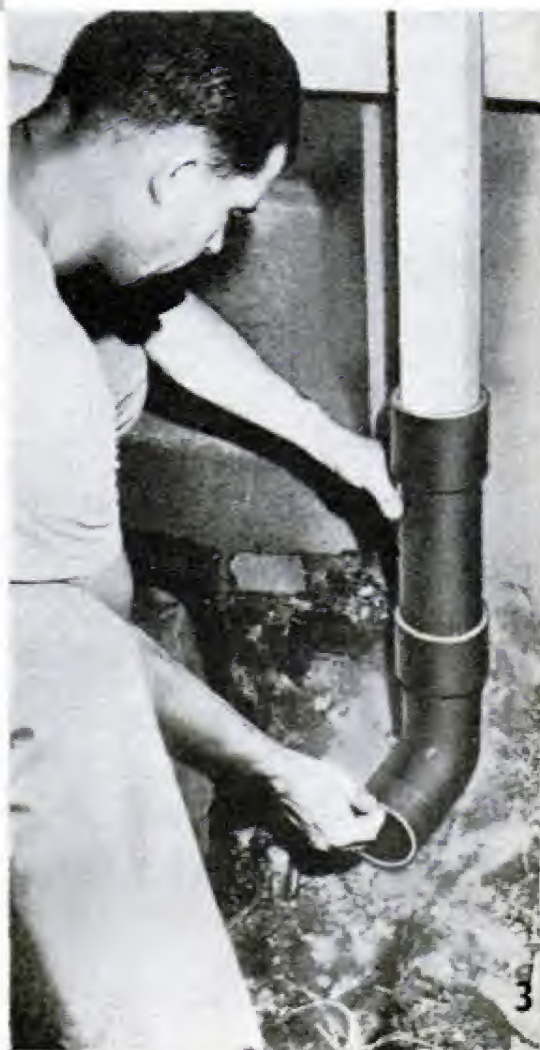
Archer-Daniels-Midland, 700 Investors Bldg., Minneapolis 2, Minn.

2. REDWOOD FINISH is clear, like varnish, does not contain pigments. Gets its durability and resistance to breakdown from ultraviolet and mildew inhibitors incorporated in finish itself. Thus, by providing a protective shield against harmful effects of sunlight and discolorations caused by mildew, this new finish offers protection to redwood exteriors not heretofore achieved. Material spreads easily and uniformly with a brush, levels and dries without sags or runs. In applying, be sure to follow instructions on the container in detail.

Linseed Oil Products Corp., 1603 Talbert Ave., Santa Ana 50, Calif.

3. FIBER PIPE ELBOW to connect downspouts to underground dry wells or other types of underground drainage systems, has been made available. Elbow is supplied in a 100-deg. angle which automatically provides the correct slope for the underground drainage lines. Both elbows and pipe are easily cut to required lengths and tapping the tapered joints together forms a tight, permanent seal against leakage. Pipe resists crushing, perpetual dampness and frost damage, yet has greater flexibility than either metal or clay drainpipes and tile.

Bermico Pipe Div. of Brown Co., Boston 14, Mass.



3

4. ALUMINUM IN A TUBE joins almost any material in a lasting repair. It applies like putty but dries as hard as metal. Use it to join parts of wood, porcelain, plastic, glass, leather, and also common metals. Stops leaks in plumbing, repairs car mufflers, fenders, broken parts of metal toys. Unusual features of the product are the applicator which is a part of the screw cap, also the projection inside cap which prevents the material from hardening in neck of tube

Amee Corp., 111 John St., New York 38, N. Y.



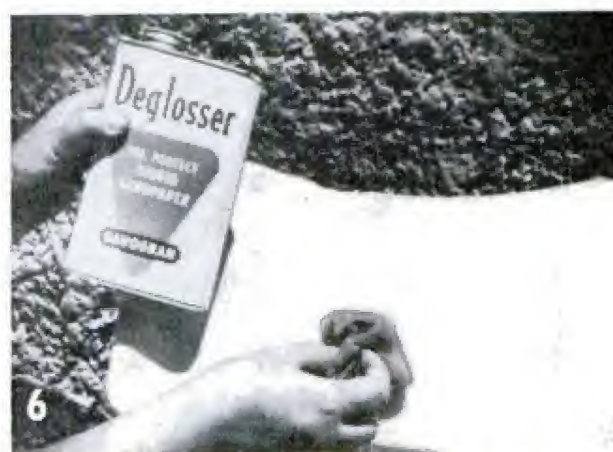
5. SASH LOCK holds sash securely at any point desired. Partly open sash cannot be pried up. Pressure up or down causes lock to grip tighter. Also holds sash closed as effectively as any conventional sash lock. Attaches to stile, either in the position pictured or lower, by means of two screws. Lock is released simply by pressing projecting levers together, levers being provided with finger pads for this purpose. Available in attractive brass or nicked finish

Two-Way Lock Co., 220 Insurance Exchange Bldg., Des Moines, Iowa



6. WIPE-ON LIQUID preparation smoothes old painted and varnished surfaces in preparation for new finish. Cleans off dirt and grime and eliminates fine checks. Won't injure hands or damage surface on which it is used. Leaves no finish-softening residue; new finish can be applied over old without any further preparation. Also removes the gloss of the old finish and prepares a surface to which new finish will bond solidly. Helps to prevent peeling of new finish

Savogran Co., 25 Huntington Ave., Boston 16, Mass.

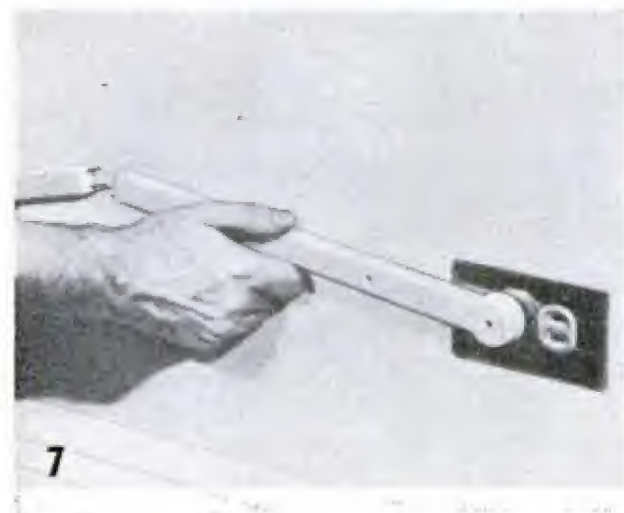


7. SURFACE-MOUNTED ELECTRICAL OUTLETS wherever you want them are provided by this interlocking wall strip. One of its features is a special cap which, when plugged into the feeder outlet, makes possible either horizontal or vertical installation of the strip. Four different units are available to make up an interlocking raceway: a straight link for extension purposes, an outlet link with three receptacles, a flexible link and the cap which plugs into feeder outlet

Cable Electric Products, Inc., Providence 7, R.I.

8. WEDGE-SHAPED CORK STRIPS combined with ribbed aluminum building sheets make this attractive wall covering. Both products are now available for use in this combination. The colored cork strips are made wedge-shaped to fit tightly in the valleys between the aluminum ribs of the base sheets, leaving the top of each rib showing between the strips. In addition to its decorative value, the combination also affords a measurable degree of soundproofing

Kaiser Aluminum & Chemical Sales, Inc., 919 N. Michigan Ave., Chicago 11, Ill.

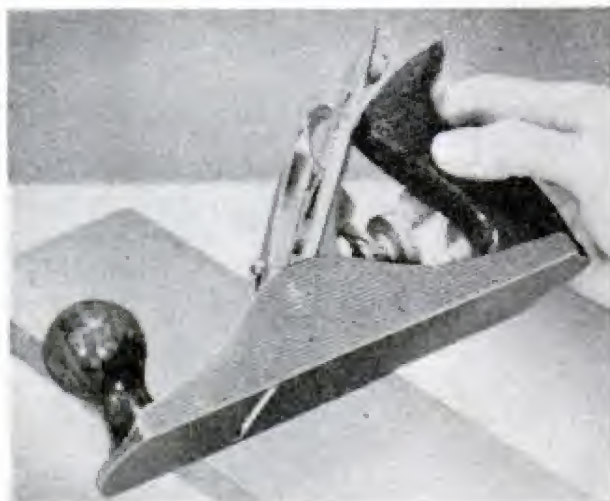




Rust Erased From Tools

Rust on small tools and precision instruments is easily removed with a glass-fiber eraser of the kind used to make corrections on duplicator stencils. Obtainable at any stationery-supply store, these erasers are made up of fine glass-fiber bristles held in a plastic holder. Unlike abrasive cloth or chemical compounds, they will not attack the metal itself but only rust and other foreign matter adhering to the surface. The bristles are able to penetrate into crevices which are almost impossible to clean by other methods.

H. J. Gerber, Stillwater, Okla.



Plane Gauges Work Surface

If while planing the flat surface of a piece of wood you find that a carpenter's square is not at hand, make a rough estimate as to the uniformity of the surface by using the edge of the plane in place of the carpenter's square.

R. Hanscom, Elmhurst, Ill.



Jig Cuts Gaskets to Order

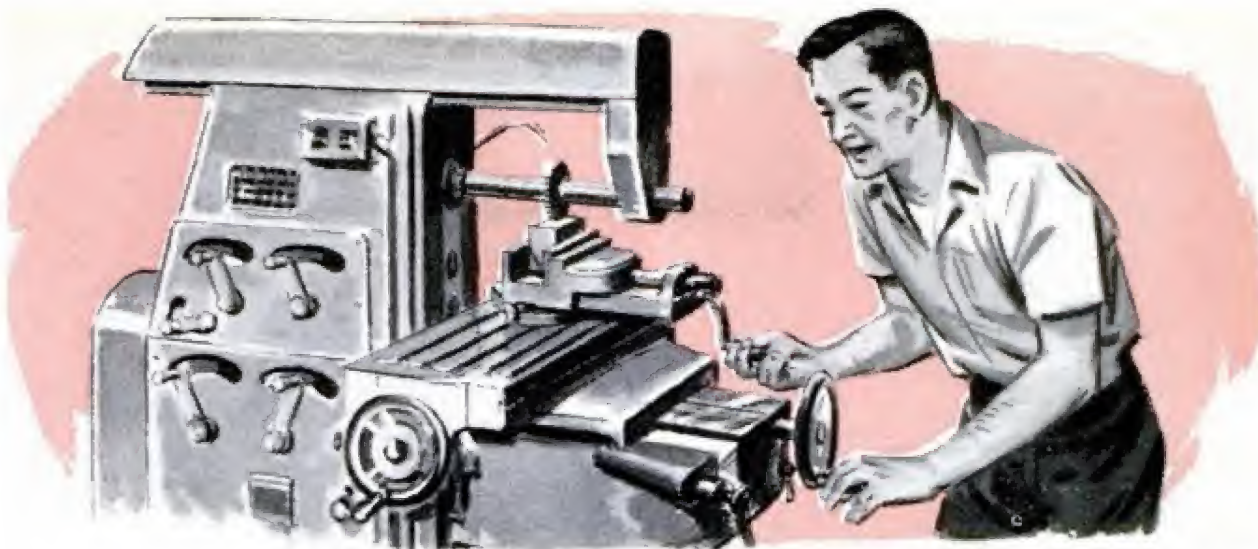
This fast-cutting gasket jig is made of two $\frac{1}{4}$ -in. steel plates measuring $2 \times 7\frac{1}{2}$ in. Drill two $\frac{3}{16}$ -in. holes in diagonally opposite corners, as shown. Dowels placed in these holes should fit tightly in the bottom plate and slip-fit the top. Drill a series of holes through both plates ranging from $\frac{1}{8}$ in. to $\frac{3}{4}$ in. or whatever sizes you prefer. Punches are cut from round stock and should be about 3 in. long. To use the jig, place gasket material between the two plates and strike it with a punch and hammer for a perfect cut.

S. Clark, East Bradenton, Fla.



Nut Used as Tap-Drill Gauge

If a tap-drill chart is not available, it is possible to determine the proper size tap drill for the job by using a nut. Select a nut which will screw onto the tap to be used. Then select a drill which will just fail to pass through the nut. With this slightly oversized drill, the hole will be tapped a little less than the full depth of the thread and allow freer threading action. Though full-depth threading is seldom required, if it is desired, select a drill which fits snugly into the hole in the nut.



SETTING SWIVEL-BASE MACHINE VISE

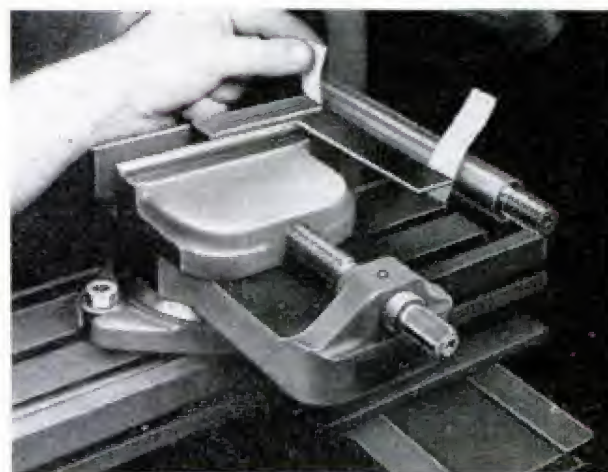
By H. J. Gerber

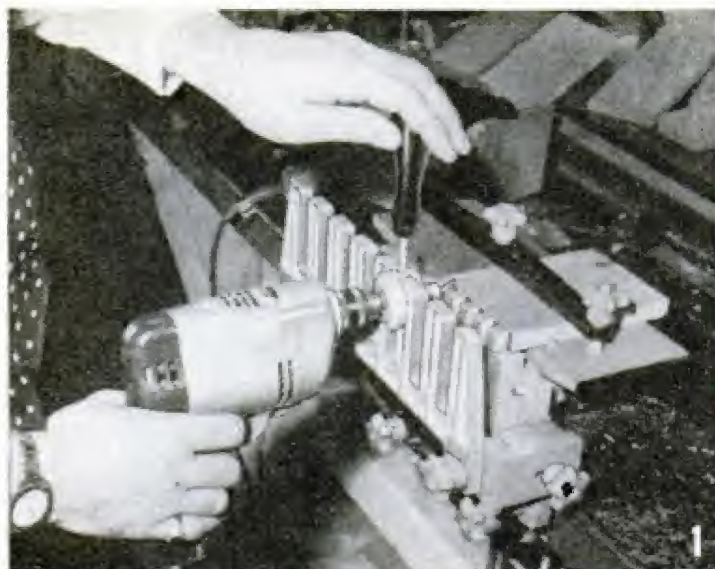
GRADUATIONS on a swivel-base machine vise give accurate settings if read correctly. That's the trick, reading the setting "within the index mark," especially if the light isn't too good. If you don't trust your eye to achieve a precise setting, here are suggestions for setting a vise with paper feelers.

As an example, take the first method pictured in the top photo at the right, that of setting the vise jaws parallel to the milling-machine spindle. Bring the jaw up to the spindle with tissue-paper feelers in place as indicated. Have a soft hammer handy to tap the vise lightly. The accuracy of the setting is dependent on one's ability to determine by feel the uniformity of tension on each of the two feelers, but if you're careful you can come very, very close to a precisely true setting.

Using a machinist's square the vise can be swiveled and set perpendicular to the spindle by using the method pictured in the center photo. Note how the paper feelers are placed.

Another method often used is shown in the lower photo. Here the square bears against the vertical ways of the machine pedestal, the paper feelers being placed between the blade of the square and the surfaces of the ways. Always be sure that the machine is clean. Make sure that there are no metal chips, waste or even heavy oil or grease on any of the surfaces used in making the settings.





SHOPPING FOR TOOLS

1. CLAMP AND FINGER GUIDE utilize the speed and power of a $\frac{1}{4}$ -in. portable drill to cut dovetails with machine precision. Drill drives the dovetail cutter which is carried in a grooved collar, the latter fitting in the slots of the finger guide. Cuts the pins and sockets in one pass of the cutter. You finish with a complete dovetailed corner joint ready to assemble

A. Robinson & Co., Ltd., Knowsley Rd., Bootle 20, Lancs, England

2. BLIND FASTENER has been designed to hold fixtures in hollow construction with extraordinarily narrow expansion areas. As an example, these fasteners can be used in hollow-core doors and in plywood or wallboard installed over furring strips. Units are self-adjusting to grip any material that will withstand pressure. Come in two lengths, 0 to $\frac{3}{16}$ and 0 to $\frac{3}{8}$ in.

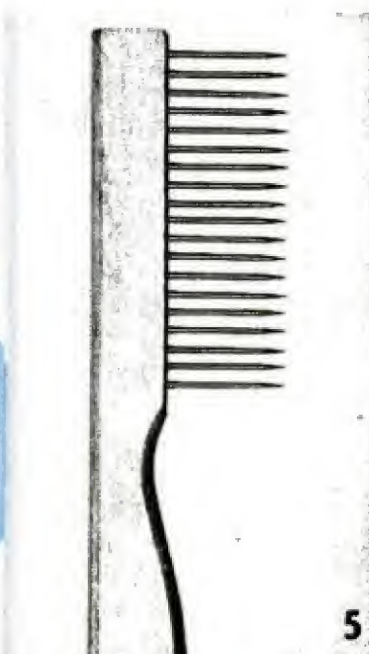
Molly Corporation, Reading, Pa.

3. HAND-OPERATED SHARPENER puts a keen edge on rotary lawnmower blades with a few light strokes. No adjustments are necessary; no need to remove blade from spindle, except on some older type mowers having no grass-clipping chute. The sharpener automatically gives the correct bevel on any blade from $\frac{1}{8}$ to $\frac{3}{16}$ in. thick. Remove nicks with file

Main Mfg. Co., 3639 E. Main St., Richmond, Ind.

4. WOOD SCREW drills its own hole in hard or soft wood. Body of screw is notched as pictured, forming cutters which remove wood as screw is driven. Screws are heat treated; won't twist off under extreme driving tension and slots will hold driver blades without breaking out at corners or edges. Screws are available in all head types and in sizes commonly used

Shakeproof Div., Illinois Tool Wks., St. Charles Rd., Elgin, Ill.





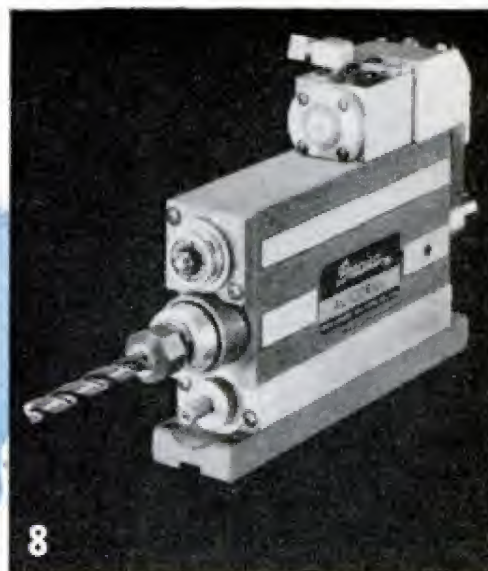
5. PAINTBRUSH COMB will be appreciated by those who need to do a thorough job of cleaning brushes. This comb does two things: it straightens bristles of brush throughout the length and at the same time spreads them, permitting solvent to penetrate and wash accumulated paint out of center of bristle clusters

Robert A. Main & Sons, Inc., 237 Pascack Rd., Paramus, N.J.



7. PLASTIC NOZZLE is corrosionproof, long wearing and is intended for use where any or all of these operating conditions must be met. The unusual spiral design of the nozzle beyond the orifice breaks up and distributes material uniformly throughout the spray pattern. Available in seven different flow rates

Bete Fog Nozzle, Inc., 309 Wells St., Greenfield, Mass.



6. GAP GAUGE combines a wrench, or bender, for moving spark-plug electrodes to the desired clearance, 6 feelers ranging in size from .020 to .040 in. dia. for checking the electrode gap, and a magnifying lens for detailed examination of small parts. All this in a plastic housing slightly larger than a half dollar

Watertown Mfg. Co., Watertown, Conn.

8. MODULAR DRILLING UNIT can be used singly or in multiples for simultaneous drilling of a number of holes of the same size or of various sizes. Pneumatic control of advance and retraction of drill and precise control of depth of hole are special features of the unit. Can be mounted in any position

Precise Autodrill Corp., Blue River Rd., Racine, Wis.

9. SUBMINIATURE SPEED REDUCER is available in 34 different ratios and will handle 16 oz.-in. of torque at the output shaft. Can be operated at speeds up to 3600 r.p.m. Input and output shafts are located offcenter in the gear case so that they can be mounted at $\frac{1}{4}$ or $\frac{1}{2}$ in. height. Weighs only $2\frac{1}{4}$ oz.

Metron Instrument Co., 432 Lincoln St., Denver 3, Colo.

10. ULTRASONIC RESONANCE GAUGE can be used for thickness measurement of nearly all metals, glass, ceramics and plastics, measurement being taken from one side of material. Unit weighs less than 5 lb., including batteries, probe, harness, cable and ear-phones, making it ideal for all common field tests

Hvanson Instruments, Inc., 40 Brown House Rd., Stamford, Conn.





11. DRILL STAND comes equipped with a magnetic base so that it can be set up on any ferrous-metal surface for drilling operations. Frame of stand is designed to take nearly all types of portable electric drills. Three sizes of stands are available for medium and large sizes of electric drills and also pneumatic drills up to 2-in. capacity. Unit works in any position, vertical, horizontal, or suspended above the workbench.
Thor Power Tool Co., La Grange Park, Ill.



12. BALANCER for rotary power mower blades consists of a light, durable plastic stand 2 in. high and 2½ in. in diameter, and a cone designed to balance on stand and to accommodate any shaft hole from ½ to 1½ in. Blade is removed from shaft and placed on balancer as pictured. If test shows blade out of balance, metal is removed from heavy end until test shows perfect balance. Test only after grinding.
Akay Corp., Div. of Hauser Products, Inc.,
4034 N. Kolmar Ave., Chicago 41, Ill.

13. ROTARY PUMP is designed to handle corrosive liquids and also liquids carrying abrasives. Supplied in two sizes having capacities of 54 and 185 gal. per hour, and is available in both sizes with or without motor, speed controls and explosionproof fittings. Unusual design of pump makes it possible to install it without altering existing tubing or piping systems and without exposing liquids to air or contaminant.
The Randolph Co., 1018 Rosine St., Houston 19, Tex.



14. ABRASIVE BAND is crowned at the center so that when placed on an inflated finishing wheel it can work a concave surface having a radius as small as 2 in. When inflated the wheel carrying the crowned band has a major diameter of 6 in. at the crown. This diameter permits work in small, round-bottom recesses which are difficult to reach into with any other type of abrasive wheels. Band is 2½ in. wide.
Nu-Matic Grinders, Inc., 8224 Carnegie Ave., Cleveland 3, Ohio



RADIO TV HI-FI

ELECTRONICS



- RADIO TUNERS
- TURNTABLES
- RECORD CHANGERS
- CARTRIDGES



Personalized STEREO FIDELITY

PART IV

By
Lothar Stern

SELECTING YOUR SOUND SOURCE

MAYBE WE'RE overdoing things a bit in this modern generation. Back in the days of Mozart and Beethoven when you wanted music you either attended a concert or you learned to play some musical instrument. Now, all you do is flick a switch and you can hear practically any worthwhile piece of music that's ever been composed, played by the world's top orchestras, right in your own living room. What's more, you can get your music from radio, from a phonograph or from a tape recorder. And when you start trading dollars for sound, one of the first decisions you'll make is—which one will it be?

Music systems, whether radio, phono or tape; whether hi-fi or lo-fi; whether stereo-

phonic or monophonic; all follow the same general pattern. All consist of a sound source, an amplifier and a loudspeaker. For stereo, of course, you'll need a dual amplifier and two speakers, but whatever amplifier and speaker system you buy, it can be used with any or all sound sources. That's where the advantage of a components-assembled hi-fi system really shows up. You can start with a single sound source, perhaps a record player or a radio tuner, or a tape transport mechanism, and expand the system as additional funds become available. And if you build the components yourself, from commercial kits, the money you save will permit you to complete your system that much quicker.

FM AND AM BROADCASTING HERE'S HOW THEY DIFFER

IN THE TRANSMITTER

FM AM



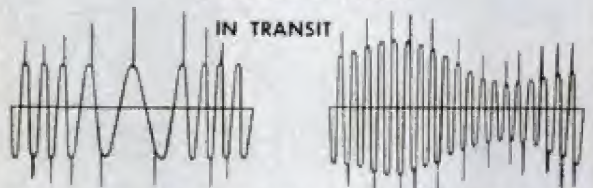
THE AUDIO SIGNAL FROM THE MICROPHONE IS THE SAME IN BOTH CASES BUT THIS CANNOT BE TRANSMITTED DIRECTLY



THE HIGH-FREQUENCY CARRIER WHICH TRANSPORTS THE AUDIO FROM TRANSMITTER TO RECEIVER. HIGHER CARRIER FREQUENCY FOR FM LIMITS RANGE TO LINE-OF-SIGHT DISTANCES



THE TRANSMITTED SIGNAL. IN FM, THE AUDIO VARIES THE FREQUENCY OF THE CARRIER; IN AM THE CARRIER AMPLITUDE IS VARIED



NOISE PULSES DUE TO STATIC VARY THE AMPLITUDE OF BOTH FM AND AM SIGNALS



HUM AND NOISE IN INITIAL RECEIVER STAGES FURTHER CHANGE THE AMPLITUDE OF BOTH SIGNALS



SIGNAL AFTER AMPLIFICATION IN RECEIVERS

CLIPPER STAGES IN FM CUT OFF AMPLITUDE VARIATIONS WITHOUT AFFECTING THE AUDIO INFORMATION. AMPLITUDE IN AM SIGNAL CANNOT BE CUT WITHOUT ALSO AFFECTING THE AUDIO



AFTER DETECTION, FM SIGNAL CLOSELY RESEMBLES ORIGINAL AUDIO. IN AM, THE DETECTED SIGNAL CONTAINS STATIC AND NOISE PULSES

Which One First?

It used to be that a basic hi-fi system was a phono system, but times are changing. Today, almost as many people start with radio as with phono. The reason—FM.

Considered all but a dead issue after World War II, FM radio has made a strong comeback in recent years. Spurred by the ever-increasing interest in good music, more and more FM stations are going on the air each year. Their broadcasts are not limited by the restricted frequency range of most AM stations and the natural immunity of good FM receivers to all forms of static and man-made interference makes them ideal for high-fidelity listening. With FM radio you may not get the exact recording you want when you want it but, if you live within range of several stations, you're almost sure to find something of interest at all hours of the day.

Stereo Transmission. There's every indication that stereophonic sound, via FM radio, will soon be available. By a process called multiplexing, FM stations can transmit the two different signals required for stereo within the confines of their assigned channels. To receive stereo you need only an FM tuner plus an inexpensive adapter.

Several methods of FM multiplexing have been perfected. Some of these are already "on the air" with limited, experimental broadcasts. The only thing holding up widespread FM stereo transmission is an FCC decision as to which method will be employed. This decision, it is hoped, will be forthcoming in the near future.

In the meantime, there's been an upsurge in the number of FM and AM stations which are broadcasting stereo on a cooperative basis. To receive these you need both an FM and an AM tuner or an FM-AM stereo tuner. While the quality of AM is not comparable with that of FM, such stereo broadcasts do sound amazingly realistic. For anyone interested in the greatest variety of music without additional cost, a radio tuner is probably the biggest bargain.

But there's no getting around it—a hi-fi system just isn't complete without a record player. Sooner or later you'll add one to your system, and if you're not within range of a number of FM stations, the record player is your best initial choice. Some public libraries now have record collections which can be obtained on a rental basis at a small cost. This reduces the need for a large investment in records right off the bat, while still giving you the type of music you want whenever you want it.

Tape is the latest medium to capture the interest of hi-fi fans. Like disc records, prerecorded tapes are available with a wide selection of recorded material. And,

say the tape enthusiasts, prerecorded tapes are inherently better than their disc counterparts. Certainly they do not lose their inherent quality with repeated playings as discs are apt to do.

But the inherent quality of tapes can be realized only with expensive professional playback equipment. Tapes played on competitively priced machines are not likely to sound better than a good disc record. What's more, the tapes are more expensive. In my opinion, a tape mechanism, or deck, is a worthwhile investment—though primarily for its recording function.

At the present time, the tape portion of the hi-fi industry is in a state of confusion—and so is the prospective buyer of tape equipment. You can buy prerecorded stereo tapes of the 2-track, $7\frac{1}{2}$ i.p.s. variety or of the 4-track, $7\frac{1}{2}$ i.p.s. type. What's more, there's an ever-increasing number of stereo-tape *cartridges*—recorded on 4 tracks at a speed of $3\frac{3}{4}$ i.p.s. In view of these differences, the selection of a tape deck, and the necessary auxiliary equipment, involves so many considerations that this will be covered in a separate article in a later issue. Here we will concern ourselves chiefly with radio tuners and record-playing equipment.

Selecting a Radio Tuner

Whether you buy a kit or a factory-assembled unit you can get a tuner in one of three ways. At a minimum initial cost you can buy an FM tuner and supplement it later, if desired, with a matching AM tuner. Somewhat higher in price are the FM-AM tuners which combine both functions on a single chassis. Usually these are less expensive than the total cost of two separate units because the same tubes and much of the same circuitry are employed for both FM and AM reception. A front-panel switch permits selection of either the FM or the AM function.

At the top of the ladder are the FM-AM stereo tuners which combine the best features of both the other methods. By having both sections built on the same chassis, such units take up little more space than a single-function tuner. But, because each



Heath Stereo Tuner . . . as sensitive as the best



EICO FM Tuner . . . performance without frills



Knight-Kit Stereo Tuner . . . something added

of the tuner sections uses separate tubes and circuitry, they may be operated individually or simultaneously—a vital qualification for receiving FM-AM stereo.

At this stage of the game the ordinary FM-AM tuner has little to recommend it. If you're interested principally in FM, or if you already have a good-quality AM radio (not the \$19.95 table-model variety), an FM tuner is perfectly adequate. If the AM function is desired as well, the versatility of an FM-AM stereo tuner makes it well worth the extra investment.

Building a Tuner Kit. Until recently, the construction of a high fidelity FM tuner was considered beyond the scope of the hobbyist or home builder. Adjustment of the various circuits was deemed so critical that only a skilled technician with special

TABLE 1. Results of tests for three kit-built tuners indicate close adherence to published specifications

SENSITIVITY	EICO HFT90-K	HEATH PT1	KNIGHT 83YX731
For 20 db quieting	4.5 uv.	less than 1 uv.	1.5 uv.
For 30 db quieting	8.5 uv.	4.5 uv.	4.5 uv.
HUM AND NOISE (Referred to 30% modulation)	-47 db	-41 db	-46 db
FREQUENCY RESPONSE	All tuners were flat within ± 1 db from 20 to 20,000		
HARMONIC DISTORTION* (At 1000 cycles—30% modulation)	1.7%	1.25%	1.6%

* These distortion figures should be used for comparative purposes only since they have not been modified to compensate for distortion inherent in the test instruments themselves.

test equipment could obtain the desired results. To test this theory, we built and tested three tuner kits of different manufacturers. The tests were run after making only those adjustments outlined in the instruction manuals—without the use of test instruments. The results given in Table I left little doubt that tuners can be built at home, and that the performance can be expected to approach the published specifications.

Quieting Sensitivity. Tune an FM receiver to a spot between stations and you will hear a great deal of background noise. The instant a station is tuned in, however, the noise almost magically disappears. That is—it disappears if the signal is strong enough to activate the receiver's clipping circuits. The weakest signal that reduces the noise to a certain level below that of the resulting audio determines the sensitivity of the set.

In FM tuners, sensitivity is expressed as the number of microvolts of signal needed to reduce the noise power to one-hundredth (20 db) or one-thousandth (30 db) of the strength of the audio. With a 20 db signal-to-noise ratio, the quality of the sound is judged "listenable"; with 30 db, the noise is almost inaudible.

The signal-to-noise ratio increases according to the strength of the station's carrier—up to a point. Beyond that, no further noise reduction is noted as the carrier strength is increased. This final noise level is the residual *hum and noise*. It, too, is specified as so many db below the strength of the audio.

Some manufacturers specify sensitivity and hum noise with respect to the strength of the *average* audio signal (30% modulation), others make the comparison with the loudest audio signal (100% modulation) that would ever be encountered. Obviously, the noise level would be lower with respect to the loudest tones than in relation to the average loudness. The reference level, therefore, must be taken into consideration when comparing the specifications given for competitive tuners.

Frequency Response and Distortion. In common with all other electronic devices, a tuner should not discriminate against high and low audio frequencies, nor should it change the character of the signal to a noticeable degree. These considerations were described in last month's amplifier article and, in general, the same information applies also to radio tuners.

Drift. One of the most annoying habits of many FM sets is their tendency to drift off frequency, especially during the warm-up period. You turn the receiver on and tune in a station, and just about the time

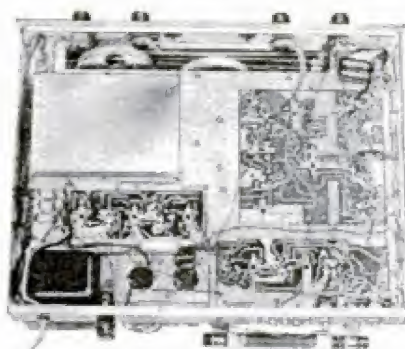
you get settled in your easy chair you have to get up again to retune the set. During an evening this may happen several times and, in severe cases, it almost takes the pleasure out of FM listening.

In hi-fi tuners, drift is usually eliminated with special circuitry called AFC (automatic frequency control). With AFC, a station will remain tuned in, but it may be difficult to tune in weak stations—particularly if these are located near some strong stations on the radio dial. AFC tends to pull in the strong stations to the exclusion of the weaker ones.

To overcome this detriment, most of the better tuners incorporate a switch which disables the AFC circuit when you want to tune in a weak station.

Other Considerations. While every FM tuner is subject to the characteristics discussed above, units of different manufacturers have various special features which may make one or the other particularly desirable. This will become increasingly obvious as we discuss some of the features of the three tested units. Before a final selection is made, the literature of several manufacturers should be studied.

Heath PT1 Stereo Tuner Kit (\$89.95)



As indicated in the table, this tuner is the most sensitive of the three, as well it should be. Its 10-tube FM section is by far the most elaborate, though construction is simplified by three printed circuit boards and a preassembled tuning unit.

If you've had just a little experience you'll have no trouble with this tuner. Its 72-page instruction manual guides you through every step of the way with careful descriptions and detailed illustrations. It's a time-consuming project, but the results are worth the effort.

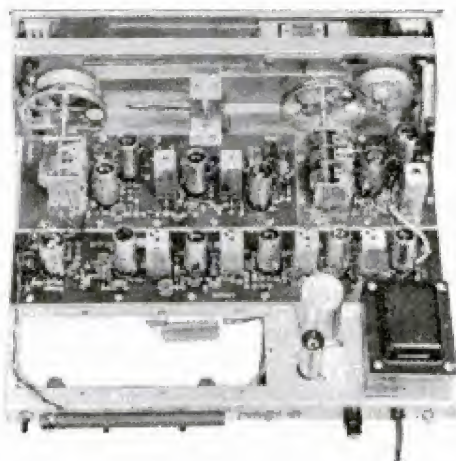
The extreme sensitivity of this tuner permits its use in many areas without the benefit of an external antenna. A built-in line-antenna provides all the signal strength you need unless you live in a fringe area.

As might be expected, there's no drift, due to AFC action, though the AFC cir-

cuit can be switched off for reception of weak stations. A built-in meter permits on-the-nose tuning—a vital factor for high-fidelity reception. A separate output jack permits later addition of a multiplex adapter when this becomes available.

On AM, a two-position "broad-narrow" switch permits changing the frequency response of the AM tuner to meet specific conditions. In the "broad" position, maximum high-frequency response is obtained. In the "narrow" position, the response is limited and the gain is increased. This position would be used for reception of weak signals or in noisy locations. A total of 16 tubes, as compared with the normal 10 or 12 used in other high-quality stereo tuners, makes this one of the best fringe-area tuners you can buy.

Knight 83 YX 731 Stereo Tuner Kit (\$87.50)



Though less sensitive than the Heath tuner, this latest addition to the Knight-Kit line offers several unusual features.

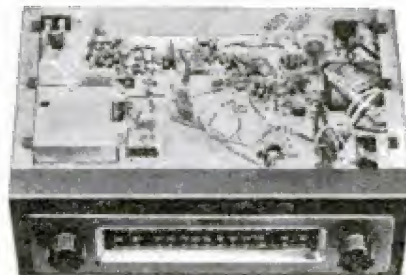
You can buy it in two ways—as a complete stereo tuner or as an FM tuner with provisions for adding the AM section later on the same chassis. And there's room enough for the subsequent addition of a multiplex adapter which Knight plans to make available as soon as the FCC approves this type of transmission.

In addition to the normal features of a high-quality tuner (AFC, tuning indicator, etc.) this unit incorporates a unique circuit for reducing distortion caused by overmodulation at the FM station. Knight calls it "dynamic sideband regulation," and it really works. Overmodulated signals which otherwise would cause considerable distortion, sound perfectly normal and the effectiveness of the circuit is demonstrable with a front-panel switch which can be used to disable the DSR.

The Knight tuner is somewhat easier to build than its Heath counterpart—at least for the less experienced builder.

Both use printed circuits and carefully prealigned parts, but the Knight-Kit includes precut color-coded wires and carded, easily identified resistors which can save a lot of assembly time.

EICO HFT90-K FM Tuner Kit (\$39.95)



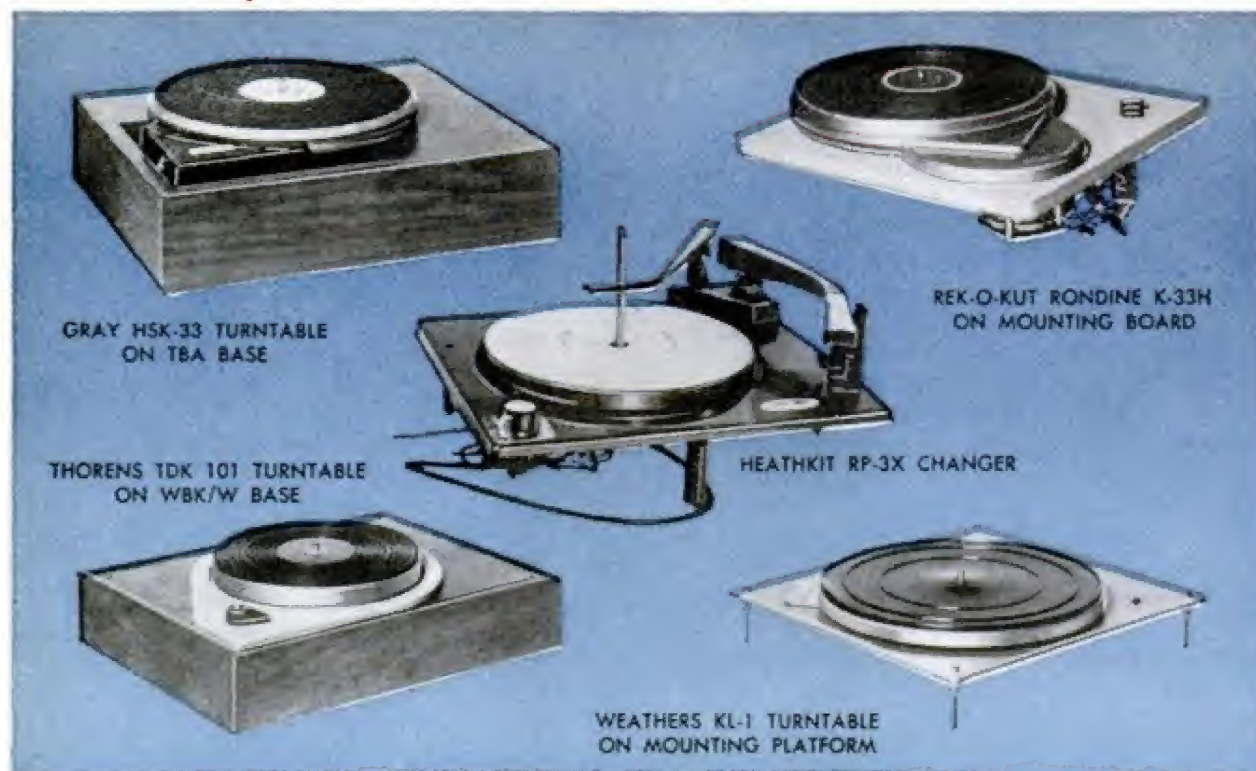
Of the three tuners tested, the Eico is the only one that does not include an AM section. It is also one of the few tuner kits which does not employ printed circuits and has no AFC action. The tests on the EICO unit, therefore, were of particular interest.

Despite the fact that every wire in this tuner must be inserted by hand, construction is not difficult. The simplicity of the circuit, coupled with a prewired tuning unit and thoroughly detailed instructions reduces construction time to about 15 hours. The only special care used in the assembly was in the parts placement to make sure that every part and wire was placed, as much as possible, in the position shown in the illustrations. And the results were gratifying indeed.

Station drift? There isn't any! Despite the lack of AFC, there was no need to re-adjust the dial once a station was tuned in. In fact, the set can be shut off at night, after several hours' use, and the next morning the same station comes in right on the nose without any retuning at all. This is amazing performance—even for much higher priced FM tuners.

In all other respects, too, the EICO tuner acquitted itself admirably. Though the 6-tube circuit is not as sensitive as that of the 8-tube Knight or the 10-tube Heath (considering only the FM portions of these sets) it is more than adequate for most applications.

With all FM tuners, an antenna is a vital part of the receiving system. For nearby stations a hank of wire will sometimes suffice, but for distance an outdoor antenna is often the determining factor between good and bad reception. A TV antenna can give satisfactory results and a single antenna can be made to do double duty (TV and FM) through the use of a two-set coupler.



Kit-built turntables and record changer. The differences are measurable but audible variations are slight

CHOOSING YOUR RECORD PLAYER

Record changer or manual player? On the surface this seems to be a simple question to answer, but if you dig a little deeper you'll find plenty to think about before making up your mind.

Automatic record changers are by far the most popular of the record-playing machines. They're used in virtually all commercially assembled hi-fi systems and in a majority of custom installations. But their popularity is no indication of absolute quality. Many confirmed audiophiles wouldn't use a changer on a bet. Their reasons—changers are harmful to records and don't provide true high fidelity. Here are some of the arguments, both pro and con, to help you decide for yourself.

Modern changers, say their advocates, combine turntable performance with changer convenience. With them, you get up to four hours of virtually uninterrupted music and the automatic set-down of the pickup arm eliminates the danger to stylus and record grooves accompanying manual fumbling. The audiophile's answer to this is that modern LP records provide in excess of 20-minutes playing time per side, which reduces the need for a changer. And if you're a bit shaky, you can buy an inexpensive accessory to a turntable which handles the pickup arm semi-automatically.

On the other hand, what about the wear and tear on the record's center hole when they are stacked on the spindle of a chang-

er or rotating about the fixed spindle? What about possible warpage of records due to insufficient support over prolonged periods of time? And it certainly doesn't help records to be dropped one on top of the other—particularly if the bottom record is rotating. If there's any danger to records, they contend, it's from record changers.

There are rebuttals even to these arguments. The raised edges of modern records prevent damage to stacked record surfaces. Polished spindles present little friction, and good changers handle records almost as gently as you could yourself. Certainly, if changers were particularly harmful, they never could have reached their present peak in popularity. In my opinion, the differences in performance between the two types of record players are of greater significance.

The object of high fidelity is to approach perfection as closely as possible. The design of a changer, because of its very function, involves a number of compromises. For example: Perfect reproduction requires a very precise turntable speed. With a changer the speed can vary considerably, depending on the number of records on the turntable. The same holds true for stylus angle which should be vertical with respect to the record groove. This angle varies slightly between the first and last record of the stack. Stylus pressure, another critical factor, changes



Hi-fi cartridges. Units shown are Shure, Pickering, Electro-Voice and ESL. Just a few of many

a bit as the stack rises and, at best, the tracking force needed for a changer is greater than for a manual player because some extra force is always required to initiate the change cycle. Finally, few if any changers, because of their inherent complexity, have the very low wow, flutter and rumble content of a professional turntable.

This deterioration is measurable with sensitive instruments, but whether it is audible is a matter only your own ears can determine. A number of current changers claim to meet minimum standards set up for professional broadcast equipment. This is undoubtedly true, but many turntables exceed this standard by a comfortable margin.

Building Your Own. For the do-it-yourselfer, there are four turntables and one changer currently available in kit form. There is a considerable price difference between the turntable kits and equivalent assembled models. The difference between the changer kit and a similar assembled model, however, is relatively small. Possibly the main advantage of building your own changer is that this procedure, though simple, acquaints you with its operation and permits you to make your own adjustments and eventual repairs.

Any of the five units illustrated can be

built in an evening. Some of the turntables, in fact, require less than an hour to build, but you'll have to add the installation and/or assembly time of a separate pickup arm.

The results of tests made on the assembled kits are given in Table II. All turntable tests were made under identical conditions and can be used as a basis for comparison. Tests on the changer were made with the built-in pickup arm and Shure M7D cartridge. Since the specified results indicate the performance of the complete unit, rather than that of the turntable alone, they are practical and realistic.

Can You Hear the Difference? Listening tests on the four turntables revealed no audible noise or distortion, even under the most critical practical conditions. With the changer, rumble and wow are audible—but only under conditions deliberately set up to accentuate these flaws. Rumble—the low-frequency noise caused by vibrations transmitted from the mechanism to the cartridge—was audible only at high volume settings, when the bass control was advanced to increase amplifier response to this form of noise. A slight amount of wow was noticed on single-frequency tones from a test record. When listening to music, these pitch variations due to minor chan-

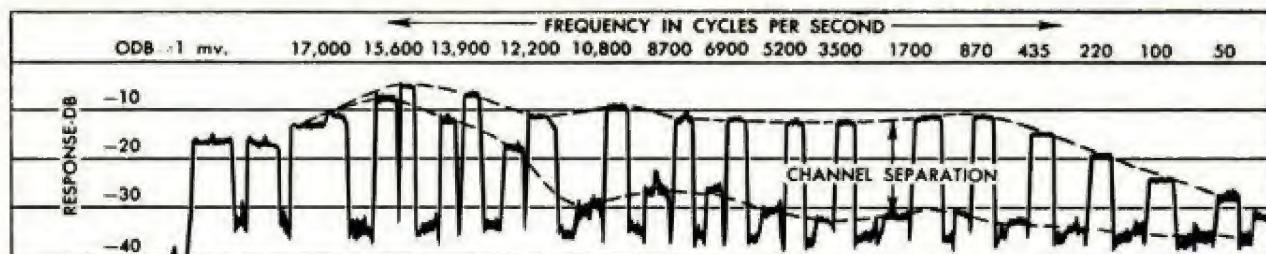
TABLE II. COMPARATIVE TESTS MADE ON KIT-BUILT RECORD PLAYERS

	Type of Motor	Absolute Speed (RPM)			Wow & Flutter % at		Rumble and Noise
		110V	115V	120V	1 Gram	7 Grams	
GRAY HSK-33 (\$49.50)	Hysteresis	33 $\frac{2}{3}$	34 $\frac{1}{2}$	34 $\frac{3}{4}$	.31	.32	—59 db
REK-O-KUT K-33H (\$49.95)	Hysteresis	32	32 $\frac{1}{3}$	33	.21	.23	—59 db
THORENS TDK 101 (\$47.50)	4-pole (Vernier speed adjustment)	Adjustable to			.17	.25	—41 db
		33 $\frac{1}{3}$	33 $\frac{1}{3}$	33 $\frac{2}{3}$			
WEATHERS KL-1 (\$34.50)	Hysteresis	32 $\frac{1}{3}$	33 $\frac{2}{3}$	34 $\frac{1}{2}$	.28	.34	—46 db

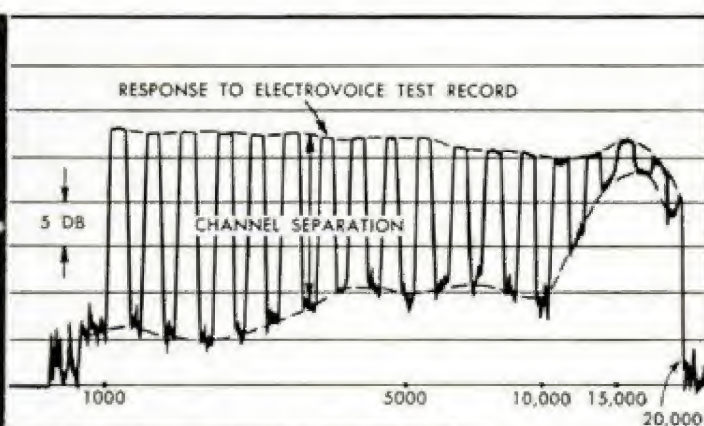
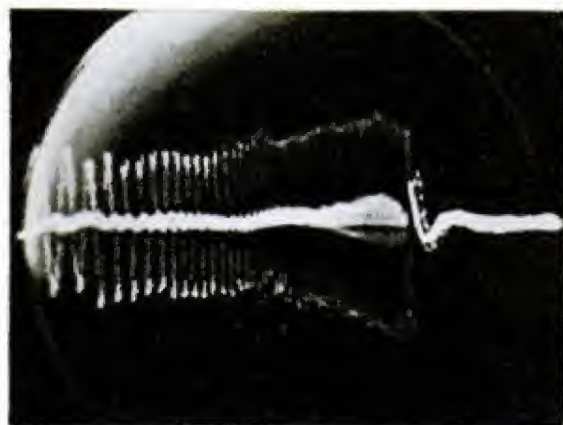
ALL OF THE ABOVE TURNTABLES ARE OF THE SINGLE-SPEED (33 $\frac{1}{3}$ RPM) TYPE

	Motor	Turntable Speed			Wow & Flutter			Rumble
		1 record	5 records	10 records	1 record	5 records	10 records	
HEATH RP-3X CHANGER	4-pole	35 $\frac{1}{3}$	34	31 $\frac{1}{3}$	.68%	.92%	2%	—36 db

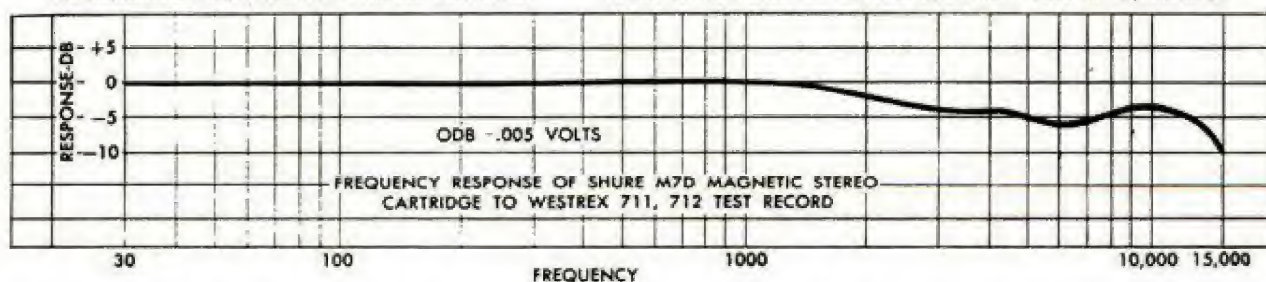
ALL MEASUREMENTS WERE MADE AT THE 33 $\frac{1}{3}$ RPM SPEED OF THIS 4-SPEED CHANGER



FREQUENCY RESPONSE AND CHANNEL SEPARATION OF ESL C-100 ELECTRODYNAMIC STEREO CARTRIDGE WITH OR 3004 TEST RECORD



FREQUENCY RESPONSE OF EV 31 MD-7 CERAMIC STEREO CARTRIDGE
OSCILLOSCOPE TRACE SHOWS OVER-ALL RESPONSE TRACE OF RESPONSE TO TONE BURSTS FROM 1000 to 20,000 CPS.



Specifications for both magnetic and ceramic cartridges are excellent. Your ears can decide what's best

ges in turntable speed were completely unobtrusive.

While a poor turntable can introduce noise and variations in pitch, the ultimate tonal quality depends primarily on the pickup cartridge. And, whether you buy a changer or a manual system, you're generally given your choice as to which cartridge you wish to use. That's because cartridges, like loudspeakers, tend to add their own characteristics to the resulting

sound. Two equally good cartridges, from a standpoint of electrical specifications, can sound quite different, and only your ears can tell which one you like best.

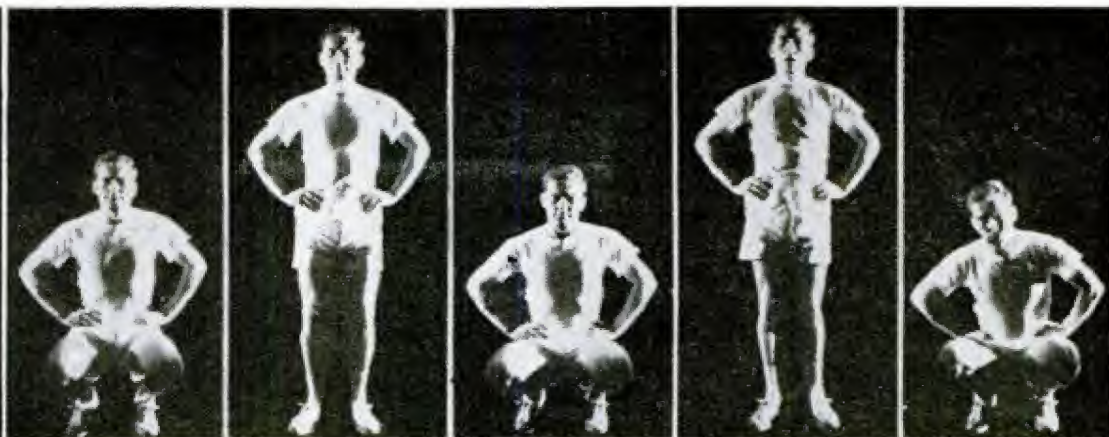
Basically there are two types of cartridges; those which convert stylus motion into electrical signals by magnetic means, and those which accomplish the same thing by causing the stylus to flex a crystal or ceramic element.

(Continued to page 268)

Not all pickup arms are alike. Try before you buy—or build—is a good motto. It's worth the effort



Too much
flexing
wears out
people...
and tires!



New "Low Profile" tire shape flexes less, reduces heat build-up, increases mileage!

NOW! THE TIRE THAT DOESN'T GET TIRED

Takes regular air pressure...yet it's lower and wider to keep you safe at top speeds!

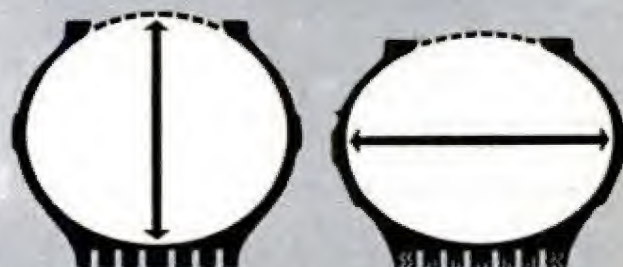
Do a few quick knee bends—and what happens? You heat up fast, soon feel real strain.

Ordinary tires do 700 "knee bends" per mile as they roll along under your car. This excessive flexing builds up torturous heat, weakens rubber and fabric, increases blowout danger.

Now U. S. Royal reduces danger of tire failure with a revolutionary new tire. Even though air pressure is the same as in ordinary tires, U. S. Royal "Low Profile" tires are lower and wider to flex less, run cooler, wear better.

"Low Profile" tires cost no more than ordinary tires. See the complete line now in 5 popular price ranges for every make and model car—at your U. S. Royal Dealer.

Same air pressure...but look at the difference!



ORDINARY TIRE

LOW PROFILE*
TIRE



STOPS QUICKER, RIDES SMOOTHER. A lower, wider shape gives U. S. Royal "Low Profile" tires more tread to grip the highway. "Low Profile" tires are made of U. S. Royal's exclusive no-shock rubber for the "Red Carpet Ride"!



STEERS BETTER, SAVES GAS. Pre-shaped to actual rolling proportions, U. S. Royal "Low Profile" tires are much more stable on curves, respond quicker in emergencies. And less flexing means 6 to 12 extra miles per tankful of gas!

ORDINARY TIRE SHAPE flexes excessively building up intense heat that murders tires, burns 'em out fast. But the **"LOW PROFILE" TIRE SHAPE** reduces flex, keeps temperature well below destructive danger zone. Running for hours on end at top highway speeds, U. S. Royal "Low Profile" tires stay cooler, keep you far safer.



PIONEERED BY U. S. RUBBER AS THE ANSWER TO GREATER TIRE SAFETY



U.S. ROYAL



United States Rubber

Rockefeller Center, New York 20, N. Y.

LOW PROFILE* TIRES

*"Low Profile" is U. S. Rubber Company's trademark for its lower, wider shape tire.

New Ideas in Photography

Drama for 8mm Movies! New Kodak Movie Camera Zooms Scenes In or Away

Now you can give your home movies the same dramatic zoom effects you see in theater movies or on your TV screen. Catch your subject in motion—then zoom in for a close-up without interrupting the action or changing your position!

The remarkable new Kodak Zoom 8 Camera (Automatic $f/1.9$) features a variable focal length lens. As you slide the lens barrel forward or back, it seems to "shrink" or "stretch" the distance to your subject.

In shooting sports scenes, for example, you can get an over-all view of the action, then zoom in on one player. When you project the scene, the player comes closer and closer, growing bigger on your screen.

You can also use the Zoom 8 lens to get the same wide-angle, regular, or telephoto effects that used to require a 3-lens turret camera. Each field is outlined in the telescopic viewfinder.

Another great feature: built-in electric eye adjusts the fast $f/1.9$ lens automatically for correct exposure. And the viewfinder eyepiece adjusts for your own eye.

Enjoy a new kind of action-packed movies with the Kodak Zoom 8. An unusual value at only \$139.50, or as little as \$14 down. Many dealers will take your old camera in trade.



Kodak Zoom 8 Camera brings faraway subjects up close without stopping the action.



Enormously magnified crystal of silver bromide (left) in 10,000-volt-per-centimeter field. It is just starting to develop; note tiny metallic silver specks along bottom. At right, fully developed silver network. Photos are of electron-microscope images.

Film Now Investigates Film, World's Most Sensitive "Amplifier"

Scientists are now using photography itself—and the electron microscope—to learn more about the inner behavior of photographic film.

They have found that when photons, the "energy bullets" of light, strike the silver halides in film, electrons are liberated. These electrons, in turn, trigger a development reaction a billion times as great as the photons' original power!

Such advanced research into the physics of film emulsions gives Kodak new knowledge to create faster, finer grained films for amateur and professional use.

from Kodak

Screen Arrow Adds Showmanship to Automatic Slide Shows

Now when you show slides to guests you can point out details on your screen without leaving your chair for even a moment.

Lift a finger-tip control on your automatic Kodak Cavalcade Projector—and a shadow arrow appears on the screen. Up, down, right, left—the arrow moves as you choose, to point out details you want to discuss.

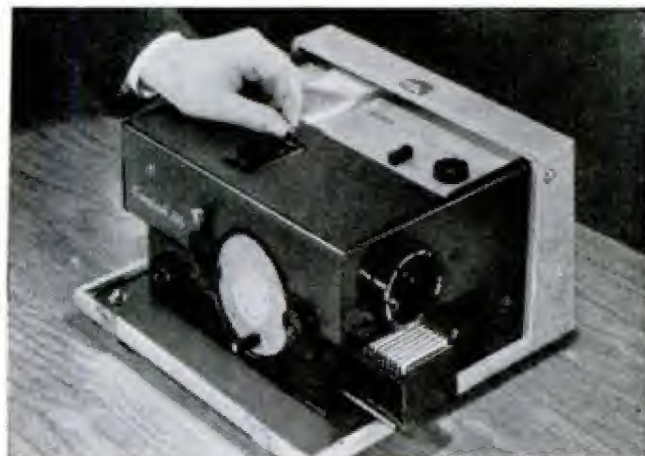
And all the time, your Cavalcade is changing slides automatically at the pace you chose—as many as 40 slides in sequence. Instant change between slides, too—no long drag or dark screen!

Controls let you hold, repeat, or skip any slide—or lift out any slide with a finger-tip ejector. And each slide is held in its own steel protector, for smooth showing, no jamming.

Take some slides along when you ask your dealer to demonstrate this wonderful projector. With $f/3.5$ lens, only \$124.50, or \$12.50 down.



Arrow points out details as you talk about them.



Control for arrow is easy to reach, easy to use.

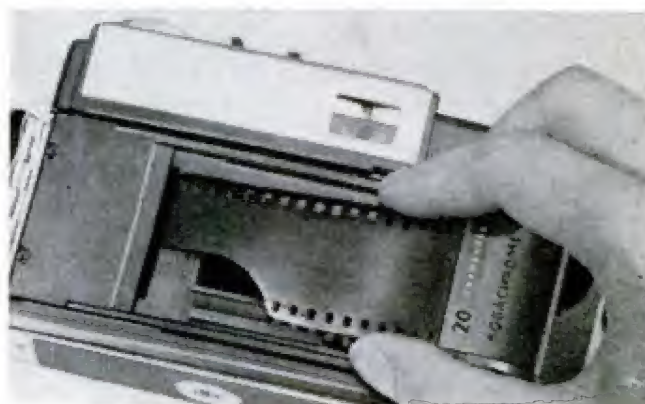
Ingenious Film Loading System Does Away With Take-up Spool

Here's the quickest, simplest 35mm film loading ever devised. No threading or hooking on a take-up spool. *There isn't any spool.*

With the Kodak Signet 80 Camera, you just drop the film in, start the tip into a slot, and close the camera back. As you advance the film, it feeds smoothly into an expansion chamber.

Such ease of operation is typical of the Signet 80. Exposure control is easy—the built-in light meter ends guesswork. Focusing is easy, rangefinder couples to all lenses. Film advance is easy—two thumb-flicks!

This is truly the camera with the skill built in. See for yourself. With 50mm $f/2.8$ lens, only \$129.50, or as little as \$13 down.



Loading so easy you can do it blindfolded!

35mm wide-angle lens for Signet 80, \$57.50; 90mm telephoto lens, \$69.50; multi-frame finder, \$17.50. Other aids available for ultra close-ups, sports, even photomicrography.



Prices are list, include Federal Tax, and are subject to change without notice.

EASTMAN KODAK COMPANY, Rochester 4, N. Y.

SEE KODAK'S "THE ED SULLIVAN SHOW" AND "OZZIE AND HARRIET."

Kodak
TRADEMARK

Clinic for Homemakers



As a service to our readers in solving the hundreds of problems pertaining to a home—inside or out—the editors of *Popular Mechanics* invite you to present your problems to The Clinic Editor for help and advice. Address your questions to The Clinic Editor, *Popular Mechanics Magazine*, 200 East Ontario Street, Chicago 11, Ill.



Brown Tinted Lawn

Q—Last year after mowing my lawn I noticed each time that the grass turned a brownish color over most of the area. I examined the blades of the grass closely and noted that the tip of each blade was discolored for a distance of $\frac{1}{4}$ in. or so just below the point where it had been cut. What is wrong?

Is this a disease, or what?—O.D., Md.

A—No, it is not likely that disease is present, nor is there anything especially wrong except that your mower is dull. That brownish patina you see on many lawns a day or so after mowing is due to the blades being torn at the point of

cutting rather than severed cleanly. In dry weather this mower defect does considerable damage. Sharpen your mower and keep it sharp. This is just as true of the rotary mower as it is of the reel-type mower. And be sure that the mower is set to cut the grass at the proper height, $1\frac{1}{2}$ in. on the average lawn in spring and about 2 in. or more in summer.



"Mums" Grow Tall

Q—My chrysanthemums grow so very tall each year that long before blooming the plants fall over and become entangled. Half the blooms are ruined or are invisible. I've been told that the thing to do is cut them off in early summer to a height of about 12 in. I've never tried this. What would happen?—D.L., Kan.

A—Don't cut the plants as you have been advised. From your description we would judge that your plants are growing in beds and that they need thinning to permit more normal growth of those remaining. A common procedure is to keep the plants pinched back, forcing them to develop numerous stems and more larger blooms. Many successful gardeners begin pinching back the tips early in the growing season, but unless you are concerned mainly with extra large blooms, it is perhaps well to allow the plants to attain a height of 12 to 15 in. or more before tipping in the manner described. Plants that grow in open beds or in plantings along walls and at the edges of beds often need to be permitted to grow to a somewhat greater height and be supported in a manner similar to a tomato plant by means of a circular wire rack.

(Continued to page 226)

LOOKING FOR LONGER WEAR IN SAFETY SHOES?

TRY Lehigh SAFETY SHOES with NEOPRENE SOLES!



Neoprene soles give longer wear...

resist oil, grease, chemicals
and cold weather cracking.

Neoprene soles are resilient
...cushion each step...help
make standing jobs less tiring.

Ask for neoprene soles
the next time
you buy safety shoes.



REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING...THROUGH CHEMISTRY
POPULAR MECHANICS



Light plane record holder uses Champions! Max Conrad set a new endurance record for single-engine, light planes last June . . . 7,668 miles non-stop! His Lycoming-powered Piper Comanche was sparked by Champions.



Outboard record holder uses Champions! Hugh Entrop holds the world's outboard motor record with a dazzling 107.8 miles per hour. His stock Mercury outboard was powered by Champion spark plugs.



Land speed record holder uses Champions! Mickey Thompson set a new American speed record of 363 m.p.h. at Bonneville Salt Flats last October. His car's four Pontiac engines were all sparked by Champions.



Indianapolis record holder uses Champions! Rodger Ward set a new record at Indianapolis last year at 135.8 miles per hour. Rodger, like 9 out of 10 race car winners, uses Champion spark plugs!

Q. Why do the record breakers, in field after field, use Champion spark plugs?

A. Because they know they can depend on Champions to wring every bit of performance out of every drop of gas. Your car will perform better, too (and save money on gasoline) with new Champions. Put in a set every 10,000 miles!

*Worn spark plugs waste lots of gas—
so check your plugs every 5,000 miles!*



Material and design are trademarks of Champion Spark Plug Company.

Watchmaker's Precision

plus a

BULL-DOG GRIP



Specially
Designed

CHAN NEL LOCK[®]

No. 718 Long-reach

Flat-Nose Plier

Looking for a precision plier that really takes hold in hard-to-reach places? Here's your answer . . . this specially designed CHANNELLOCK Flat-Nose Plier. Just the ticket for electrical, radio, TV, Hi-Fi and other electronics work. Micro-matched, scored, long, flat jaws. Comfortable, blue-plastic grips. Top quality, polished forged steel. Ask your tool supplier for a CHANNELLOCK No. 718 Flat-Nose Plier.

If he's out of them, ask him to order one for you.



Write for Catalog of
Complete Line of Pliers

CHAMPION DEARMENT TOOL COMPANY

Meadville 1, Pennsylvania

Driveway Repair



Q — My concrete driveway is poured along the house foundation for a distance of about 20 ft. Now after 5 years or so, the driveway slab has cracked at the center and the half next to the house foundation has tilted toward the wall. When it rains hard I get trickles of water in the basement.

What to do is my problem. Should I remove the defective part of the driveway and pour new concrete, or is there some way to repair the old? —E.P., Mich.

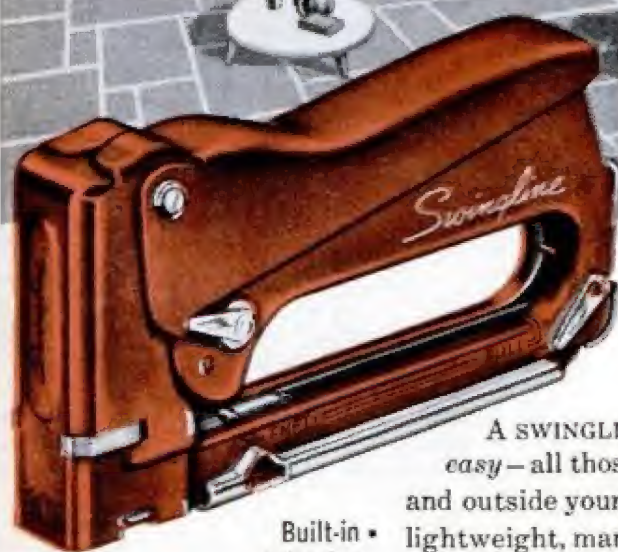
A—It's rather hard to decide just what is best to do. No doubt the original driveway slab was poured over freshly graded earth which had not been properly tamped or perhaps not even allowed to settle normally. Such a condition alone would leave the slab without adequate support on that half which is laid over the area originally excavated for the foundation wall. Perhaps in the long run it would be best to plan on replacing at least the defective half of the slab. It might be advisable to consider replacing that portion of the entire slab which is poured along the wall. The latter procedure would permit the preparation of an adequate bed for a wire reinforced slab. First, lay a tamped gravel fill at least 4 in., and better 5-6 in. thick, pour and spread a grout coat, lay the wire reinforcement and finish by pouring a slab at least 4 in. thick. There should be an expansion joint along the foundation wall and the slab should be tilted away from the wall at least 1 in. across its width to permit water to drain away from the wall. Of course, it also is necessary to check the new portion of the driveway for slope, or fall, along the length to carry water away so that it does not stand at any point.

Growing Gladiolus

Q—I'd like some general information on growing gladiolus, where and how to plant the bulbs, how deep to plant, what kind of soil is best, how and when to use plant foods, and so on.—L.A., Wis.

A—Gladiolus require very little attention during the growing season. Of the summer blooming bulbs they are among those easiest to grow. The plants do require an enriched, friable soil that has been deeply spaded or otherwise worked, preferably in the late fall. They need exposure to full sunlight and they should never be planted where they must compete for available plant food with trees or shrubs. Good natural drainage also is essential. Glads will not thrive in heavy wet soils or in an area that is flooded after a heavy rain. Planting can begin in the spring as soon as the soil is dry and loose. The larger corms are placed in a trench, at a depth of about 6 in. in a sandy soil and from 4 to 5 in. in a heavier clay soil. The smaller corms are never set so deeply; a fair rule of thumb to follow is planting them at a depth roughly 4 times the diameter. Ordinarily corms of large and small sizes are placed about 6 in. apart in the trench. Some gardeners prefer a spacing of 8 in. Cover the corms with loose, fine soil but do not fill the trench entirely. After planting keep the soil stirred by hoeing or cultivating to a depth of 1 in. or so to develop a self-mulch, or dust mulch, to conserve moisture. Water sparingly during the period after planting and before the first blades, or leaves, show above ground. Always stir the top soil after watering or after a rain. Do this as soon as the soil is sufficiently dry on top to make it workable. After the plants reach a height of 6 in. or so, dig a trench on each side of the row and about 4 in. from it. Each trench should be 5 to 6 in. deep. Place a complete fertilizer in the bottom of the trench in the proportion of about 2 lb. to 50 ft. Fill the trench with loose soil, water lightly and again stir the top soil as soon as it is sufficiently dry to work. After the blooms have been cut the plants should again be side dressed with a complete fertilizer in this same manner. The second side dressing will develop stronger corms for next year's planting.

See what you can do...easily; quickly ...with a SWINGLINE STAPLE GUN!



ONLY \$ **4⁹⁵** with
**PUSH-BUTTON
LOADING**

A SWINGLINE staple gun makes *immediately possible*—and *easy*—all those time consuming, hard-to-do chores both inside and outside your home. This

- Built-in • extractor
 - Handle lock •
 - Push-button • loading
 - Rugged, heavy-duty • steel construction
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 - Open channel • takes 2 staple sizes: 1/4" and 5/16"
- The price? A hard-to-believe \$4.95—that's all! Your choice of Gray, Red or Green. Insist on a SWINGLINE staple gun—with push-button loading—at better hardware, department, stationery stores!

FREE! Send

for Booklet "Tips
for Tacking"
How to do many
stapling jobs.



CHECK THIS LIST

- A—wire fencing
 - B—screening
 - C—window shades
 - D—weatherstripping
 - E—tar papering
 - F—outdoor decorations
 - G—repairing shutter slats
 - H—fastening vines to trellis
 - I—recovering furniture
 - J—television antenna wire
 - K—burlap covers on shrubs
 - L—cold frames, with plastic sheeting
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 - N—picnic table covering
 - O—awnings
 - P—markers for seeding
 - Q—bird houses
- And hundreds of other uses.

Swingline INC.

World's Largest Manufacturer of Staplers For Home and Office!

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You can do more with

DELTA



Angular drilling for the splayed legs on a coffee table is no problem with this tool because the angle of right or left tilt can be set by a calibrated scale and locked into position. Resetting head to vertical position is simplified by setting of the automatic stop into a milled groove.



Inlay routing in the center of a 30" x 40" project is possible because there is 16 3/8" capacity between the column and the router bit. Use of the fastest of the four speeds available makes this a smooth operation. Controls are conveniently grouped "up front" for safe, positive action.



Spindle drilling on an extra long hand rail *does not* require a special fixture or jig because the head tilts. Big 3/4" x 23 3/4" x 15 1/8" table gives adequate support while remaining parallel to the base. Laminated wood work surface is mounted to a fully machined 8 1/2" x 9" cast iron table.

New radial drill press



**makes
"impossible" drilling
easy**

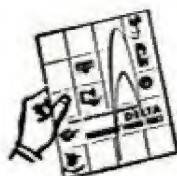
DELTA 32" RADIAL DRILL—basic machine complete with $\frac{1}{2}$ " capacity geared chuck, belt and motor pulley.

Weight 85 lbs—only **\$89.50** (slightly higher in the West).

Here's just what you'd expect from Delta—a brand new radial drill—specifically designed to handle drilling jobs you *can't* do on a conventional drill press. There is almost no limit to the flexibility this tool puts at your fingertips—and you'll really appreciate the big capacity. The head swivels 360° around the column, tilts more than 90° left and right, travels almost a foot forward and back—yet the work always remains parallel with the base. You can drill to the center of a 32" circle, rout, sand, mortise, do dozens of operations at your choice of four speeds (700, 1250, 2400, 4700 r.p.m.) on a wide variety of materials.

You can count on this tool to extend your skill, broaden your range of projects. And because you know tools, you know you can count on the precision, ruggedness and safety that Delta's 31 years of experience build into tools used throughout industry and in home workshops.

Consider the many ways you can do more jobs better, quicker and easier with the *newest* Delta tool—you'll want to see the Radial Drill in action! Visit your Delta Dealer (he's listed under "TOOLS" in the Yellow Pages) or your leading Department, Hardware or Building Supply Store. Do it soon!



See the world's most complete line of home workshop power tools and accessories—pictured and described in this colorful, FREE Homecraft catalog. Write to: Rockwell Manufacturing Company, Delta Power Tool Division, 502D N. Lexington Ave., Pittsburgh 8, Pa. In Canada: Rockwell Manufacturing Company of Canada, Ltd., Guelph, Ontario.

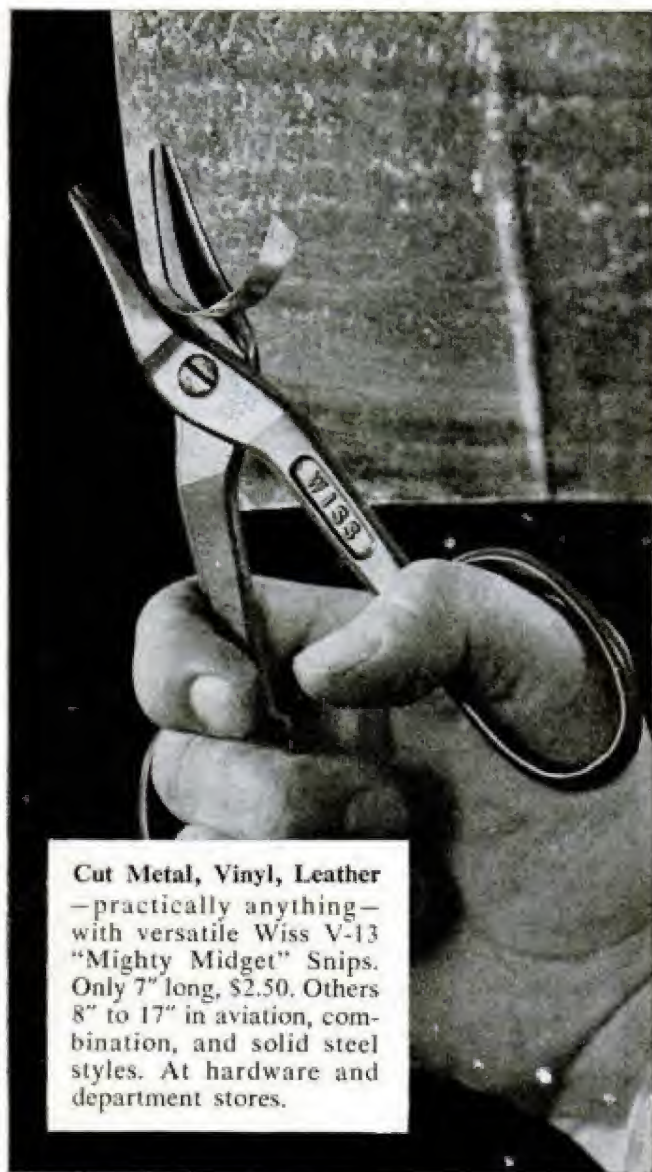
DELTA POWER TOOLS

another fine product by

ROCKWELL



Cut it with WISS



Cut Metal, Vinyl, Leather—practically anything—with versatile WISS V-13 "Mighty Midget" Snips. Only 7" long, \$2.50. Others 8" to 17" in aviation, combination, and solid steel styles. At hardware and department stores.

OTHER FINE WISS CUTTING TOOLS

GRASS SHEARS

No. 701

\$2.75

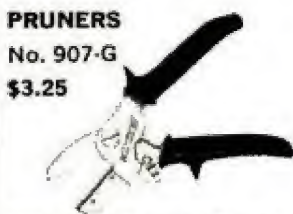


Easiest cutting, fastest cutting grass shears you've ever used, with molded vinyl handle grips and special closing latch. Others from \$1.39 to \$4.95.

PRUNERS

No. 907-G

\$3.25



Wiss Hy-Power Pruners, with new vinyl grips, cut toughest limbs, protect your hands. 7-inch pocket size. \$3.25 wherever garden tools are sold.

J. WISS & SONS CO., NEWARK 7, N. J.

World's Largest Manufacturer of Shears, Scissors, Pinking Shears, Skalloping Shears, Metal Cutting Snips and Garden Shears

The PM Houseboat

(Continued from page 173)

is positioned at the aft end of the cabin roof, and a socket for an ensign staff is mounted to the after deck at the transom. The spotlight and horn are optional fittings, as is the boarding ladder.

If you have been building your houseboat outdoors, painting the outside is something you would have done as soon as the exterior carpentry work was completed. At least the wood would have been protected with a priming coat. Of course, the time to apply the copper bottom paint to the hull was when the latter was upside down. The bottom paint is stopped at the water line. If you have been able to carry on construction under cover, you may be ready to paint the exterior now. An A-1 job of finishing the outside would consist of going over the entire hull, decks and cabin, and filling any ill-fitting joints with non-hardening calking. It is best to seal all exposed plywood edge grain with glass-fiber tape. Such edges will be found exposed in the hull planking and around the window openings. The bare wood should be given a priming coat, followed by two finish coats of high-grade marine paint. The glass-fibered decks and cabin roof were painted dark green in the prototype to offset an all white exterior. The rub rails, as well as the toe rail at the bow, were stained dark and finished with two coats of marine spar varnish. All outside mahogany trim was treated likewise.

Instructions for coupling two outboard motors is given by the manufacturer. Tiller cables that have been previously threaded through the bushed holes in the side frame members are brought out through holes in the transom and attached to the tiller connections on the motors. ★ ★ ★

Aircraft Jet Engine Pumps Natural Gas

The same engine that provides the thrust for military and commercial aircraft has been harnessed to a new job with its feet securely on the ground. The Cooper-Bessemer Corporation of Mount Vernon, Ohio, has developed a turbine that runs on the jet exhaust of a Pratt & Whitney J-57 engine. The turbine will run a centrifugal compressor pump in a natural-gas pipeline system. The engine is conveniently modified to operate on the same gas in the lines, which eliminates the biggest problem of jet-engine operation, their heavy fuel consumption. The first turbine, rated at 10,500 horsepower, will be installed early in 1960.



**PERFECT CIRCLE
PISTON RINGS ARE BUILT
TO TAKE IT**

25 BLOWS EVERY SECOND*

*IN ANY 4-CYCLE ENGINE AT 3000 RPM

You can't see the hammer-like blows piston rings receive, but costly results are soon evident when inferior material is used.

Correct metallurgy is one of the most important features of every Perfect Circle piston ring. Over six different metals are used at Perfect Circle...each material the highest strength compatible with the specific application...each material selected for utmost protection against breakage.

Correct, proven metallurgy is another reason why Perfect Circles are preferred and installed with confidence by leading engine manufacturers and mechanics everywhere.



PERFECT CIRCLE

**PISTON RINGS • PRECISION CASTINGS
POWER SERVICE PRODUCTS • SPEEDOSTAT
HAGERSTOWN, INDIANA • DON MILLS, ONTARIO, CANADA**

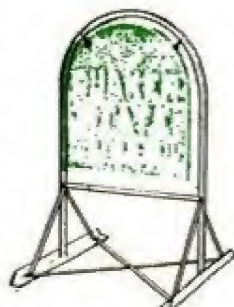


Denis Drysdale, of Lafayette, Indiana, checks the engine of his classic Auburn cabriolet.

"Quaker State keeps the engine of my classic 1936 Auburn trouble-free, and my new car too!" This Series 852 beauty boasts a 150 hp. straight 8 engine, big for its day, and dual rear axle ratios. Performance is still superb, thanks to the loving care it has always received. Important item in that care: Quaker State Motor Oil. Its long-lasting protection and complete lubrication guard any car best, new or old! Super-refined from 100% pure Pennsylvania crude oil. It's the finest motor oil your money can buy.

Available most everywhere . . . always ask for Quaker State by name.

For the name of your nearest dealer, call Western Union by number and ask for Operator 25.



QUAKER STATE OIL REFINING CORP., OIL CITY, PA.
Member Pennsylvania Grade Crude Oil Association

Policing Iceberg Alley

(Continued from page 94)

slopes away gradually, the ribbon of glacial ice presses out and down into the sea until the buoyancy of the ice breaks off the lip, and away it floats as a separate entity. When the sea floor drops away from the shore, wave action erodes the underpinning. Finally the weight of the overhanging lip cracks and with a great, roaring splash the ice ship floats free.

Bergs from the eastern coast of Greenland are caught by a current that carries them around the southern tip of the island and then north toward the Arctic Circle. En route, they are joined by the bergs that are calved each year by the 20 principal glaciers on the northwestern coast of Greenland. For an average of three years the bergs drift northward and westward and then, in the embrace of the Labrador Current, southward toward Newfoundland, the Grand Banks and the steamship lanes.

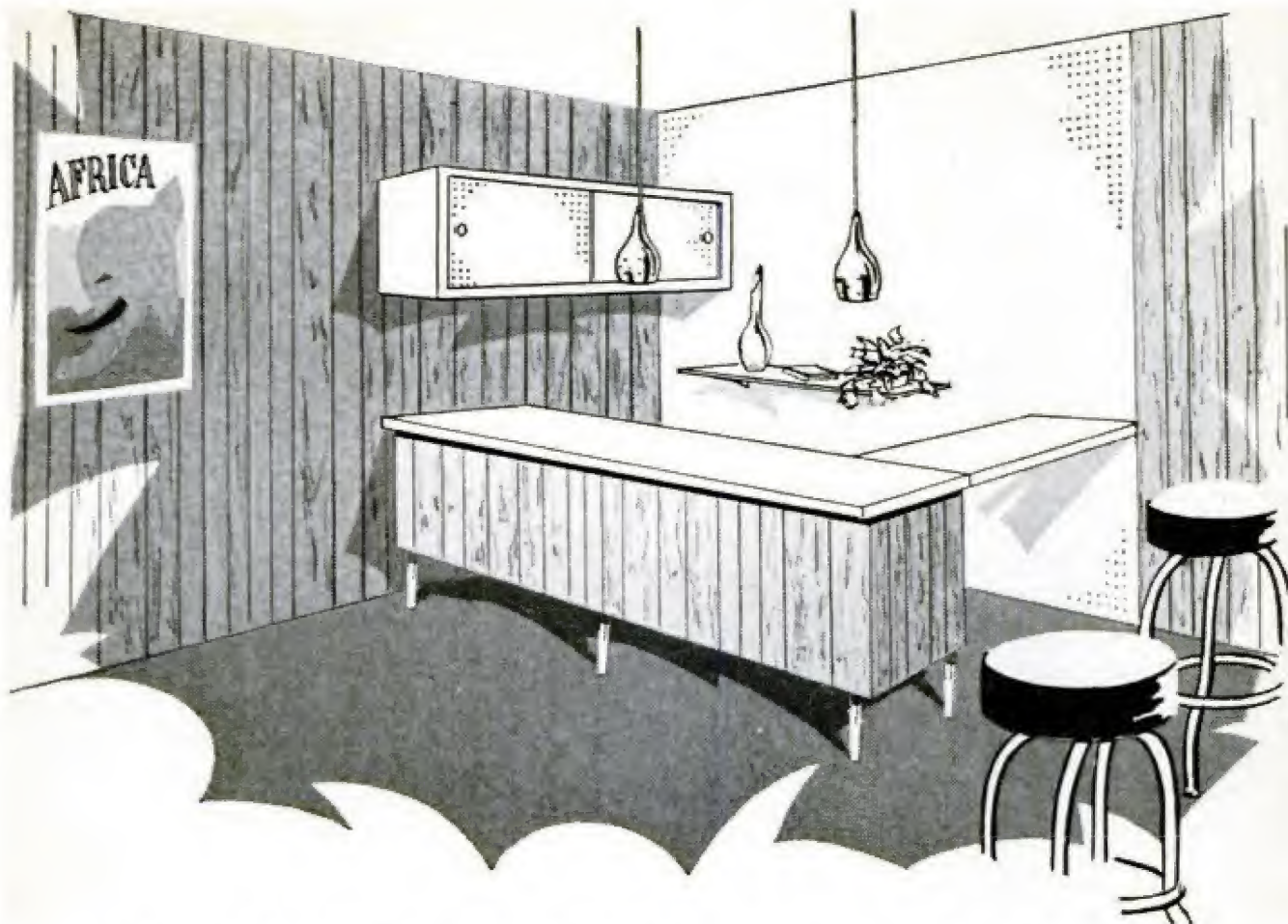
Happily, most of the bergs are stopped along the way. They run aground or are trapped in coves and slowly rot away in the summer sun. Others, however, continue to drift southward at a speed of about two knots, or more than 50 miles a day, until they pass the 48th parallel at northern Newfoundland. There they become the concern of the Ice Patrol.

The main tongue of the Labrador Current is funneled through a deep-ocean channel formed by the eastern slopes of the Grand Banks and a comparatively small midocean shoal called Flemish Cap. The Ice Patrol calls this the "Slot" or "Main Street." Through it the surviving icebergs stream toward the congested shipping lanes. There the icebergs suddenly are shunted aside by the northward-flowing Gulf Stream, known in these latitudes as the North Atlantic Current. Its temperature runs as high as 68 degrees, compared with the Labrador Current's frosty 28 to 32 degrees.

Now the bergs change abruptly. Within fewer than 40 miles, less than a day's travel for an iceberg, rivulets of water from melting ice begin cascading over a berg's sides into the sea. Mammoth chunks of ice split off and drift away. In a few days—or at most two or three weeks—the bergs are destroyed, or remnants are deflected toward northern European waters by the sweep of the North Atlantic Current.

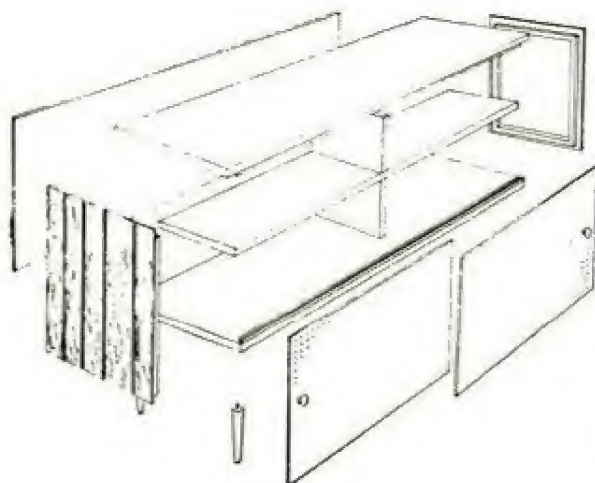
Iceberg experts can never be sure, however, that the northern fringes of the Gulf Stream will do their job as expected, says Lt. Comdr. Robertson P. Dinsmore, Executive Officer in Charge of the Ice Patrol. In

(Continued to page 248)



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Solving Crimes by Hypnosis

(Continued from page 109)

means force." He thinks that hypnosis could help to unburden this kind of witness, also.

"There's no doubt in my mind," he says, "that hypnosis, by stepping up the brain's ability to recall, could be most valuable in solving crimes."

Dr. Levendula says that hypnosis today is still surrounded by "mysticism, misconceptions and misunderstandings." It is not an unconscious state. It simply releases the subconscious mind, the storehouse of memory. The hypnotist puts you "under" by concentrating on some repetitive stimulus—"You are so sleepy, so sleepy, so sleepy"—and then makes you act by suggestion. Hypnosis, in itself, is harmless. And almost anyone can be hypnotized.

"By its very nature, hypnosis is a logical tool for the criminologist," says William Mayers of Washington, D. C., a consultant to the Department of Defense in World War II. "It amazes me that more has not been done in the field."

In the quarterly magazine, "Hypnosis," the official journal of the Association to Advance Ethical Hypnosis, he tells of instructing Army Intelligence investigators on how to use hypnosis in questioning Japanese prisoners and recommends it, not only for witnesses, in police work, but also for crime suspects, if the law allows.

"Possibly one reason why hypnosis has not been more widely used by detectives and other investigators," he writes, "is the belief that a suspect can resist being hypnotized. While this is generally true, there are methods for hypnotizing people without their knowing it. This still does not mean they can be hypnotized against their will. It simply means the trance can be induced in an indirect or disguised manner."

This "intense inter-personal relationship between two people" is brought about most readily when the subject is willing. But a person can be put into a trance before he realizes what is happening.

The experts say, too, that a suspect might try to fake a trance. He could pretend he was hypnotized and go right on lying. But he would not often fool a skillful hypnotist.

In Cleveland, Dr. Gerber feels that the time is coming when police will rely on hypnosis as frequently as they now lean on the lie detector. He thinks, however, that it will be used exclusively on witnesses to develop cases, to uncover "leads." The courts may never approve it for suspects. "If you hypnotize someone suspected of a crime, get a confession, then take it into court," he says, "you'd be stopped

right there. They'd say you were taking unfair advantage of him, that you got your evidence illegally from him when he had a constitutional right to say nothing."

A confession, obtained under hypnosis, was knocked out of the recent "Lady in Red" murder case in Miami, Fla. In the county jail, the 20-year-old suspect, Rudolph Valentino Herring, had written a note to detectives: "Help me to remember." At their instruction, he had been put in a trance by a Miami teacher of hypnosis, Julian A. Arroyo, Jr. He admitted the crime.

This unusual procedure was immediately attacked, and defended, by Florida authorities.

The prosecuting attorney, Richard Gerstein, denounced the method of obtaining the confession as "most irregular," and went on to say: "Any statement extracted under hypnosis is unorthodox and might be viewed with suspicion by a jury." Dr. Bruce Alspach, president of the Greater Miami Society of Psychiatry and Neurology, cautioned that such stories told during hypnosis may be completely false.

On the other hand, Dr. Ben J. Sheppard, who has been Dade county's medical-legal adviser, and Sheriff Thomas J. Kelly both asserted that the confession was valid. Dr. Sheppard, who had been present when the prisoner was hypnotized, said he believed that Herring had amnesia and that hypnosis "opened the door" to his memory.

The youth was indicted by the grand jury, but before his case, and the hypnosis controversy, could be tried, he was sent to a mental hospital. Anyway, the homicide squad obtained a murder warrant for him if he is released.

The question of whether a person can be hypnotized and forced to commit a crime also has been before the courts. Some authorities say that it can be done; others insist that it can't.

Perhaps the most dramatic case of this kind occurred in Copenhagen, Denmark, a few years ago. An ex-convict robbed a bank and killed two employees. He was caught, and pleaded guilty. But he testified that his former cellmate had hypnotized him and told him to commit the deeds. He was sentenced to a home for psychopaths. Then the cellmate was tried, found guilty of inciting the crime, through hypnosis, and sent back to prison for life. The legal-medical battle lasted more than six years.

You don't need to know medicine or psychiatry to hypnotize; neither do you have to be Mandrake the Magician. Hypnotists, of one kind or another, are teaching the art these days to Americans of

(Continued to page 236)



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many occupations. The American Society of Clinical Hypnosis, and the organizations in the field, are constantly warning against any misuse of hypnosis. Several communities have been considering regulatory laws.

Dr. Gerber, who is one of the few coroners with both medical and legal degrees, says that police departments will want to use only the best men, properly trained medical people, either those on the staff or on call, as hypnotists. To be truly effective, they must know a great deal about law and the problems of evidence, as well as about medicine and human behavior. "I would wish to see only those of the highest ethics and competence in this work," he says.

An instance of a hypnotist's skillful work is related by Harry Arons of Irvington, N. J., executive secretary of the Association to Advance Ethical Hypnosis.

A man whose mind was blanked out by amnesia walked into the sheriff's office in Orlando, Fla., and asked for help in finding out who he was. Deputies summoned a hypnotist, who put the man into a deep trance. He then revealed his name and age and said he had come from Hattiesburg, Miss. He had lost his memory when he was struck by a small foreign car. Under hypnosis, he not only identified himself but went on to recall minute events several years back. He returned to his family.

Valuable as Aid to Recall

Hypnotism creates, as one of its characteristics, what doctors call "hypermnnesia," which is the power to recollect seemingly forgotten incidents and details. Apparently the deeper the trance, authorities say, the better the recall.

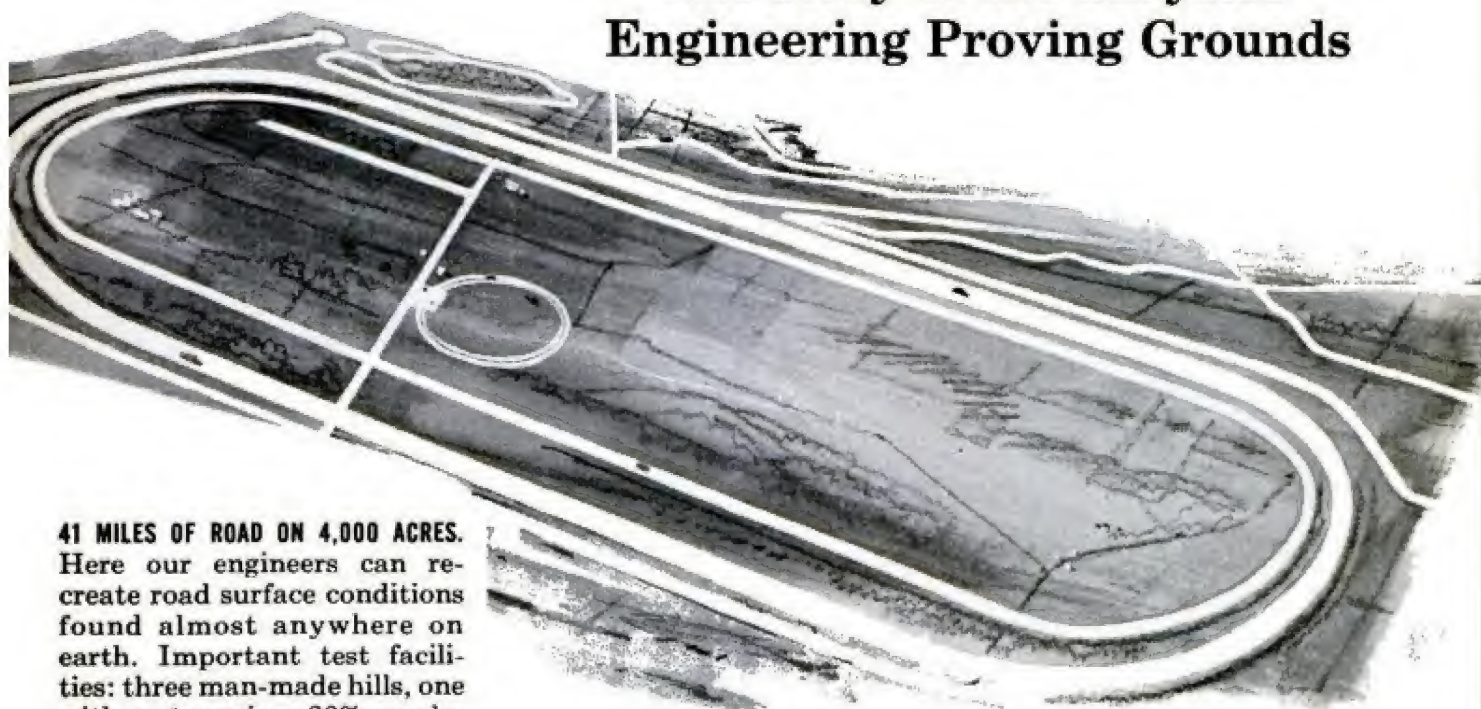
In the experiment at Western Reserve University, the five policemen were put into a shallow trance, since the event they were trying to remember had happened only moments before. Dr. Gerber believes that they could have gone into greater detail about the "murder" if the trance had been deeper. When these patrolmen were hypnotized, they were simply told that, upon awakening, they would recall more about the case.

Dr. Gerber is not ready to say that any quick way has been found to help solve crimes. Much more research is ahead.

"I am certain, though, that our studies, and those of—200—others, are going to contribute importantly to hypnosis and criminology," he says. "I can see the time when the science of hypnosis will become just as valuable in our fight against crime as fingerprinting is today." ★ ★ ★

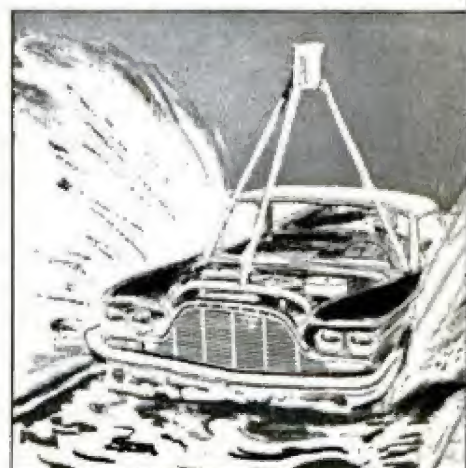
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In Search of Plants That Cure

(Continued from page 124)

rate anesthetic (particularly in abdominal surgery), a muscle relaxer and a "standard" for treating some victims of mental disorders, including manic-depressives.

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- Seaweed-derived iodine, an old Polynesian antiseptic, is a staple in your medicine cabinet and mine.
- Cortisone, some of it extracted from the African strophanthus plant (but now produced from home-grown sweet potatoes), is a miracle drug used to relieve rheumatoid arthritis.

All were "discovered," often by accident, when skeptical researchers decided to test the truth of an ancient remedy.

Witch Doctor Relieves Toothache

Recently, for example, the brother of an African foreman was agonized by a toothache. A U.S. dentist examined the tooth, declared it'd have to be pulled. The patient refused and straightway consulted a witch doctor. No heebie-jeebie quack (as some witch doctors), the herb healer—an authentic practitioner of plant medicine—worked a cure within minutes.

Amazed, the dentist jeoped three days over primitive trails to the witch doctor's hut. Cajoling the healer out of his "medicine," the dentist beelined for civilization where, in a report rushed Stateside, he described the plant—coded F57-11—and how it had accomplished its cure:

"The native doctor," reported the incredulous dentist, "filled half a gourd with water, and covered it with the other half whose top he'd drilled with a hole. Over the hole he placed three small sticks dipped in animal fat and rolled in the seeds taken from plant F57-11. He ignited the sticks and allowed them—and the seeds—to burn slowly. The medicating smoke was directed to the offending tooth through a straw. Complete relief was obtained."

Magic? Not really, say researchers. A better term might be "medical mistake."

"The native medico is the world's worst—and most ruthless—'researcher,'" says a world-roaming botanist. "He often kills dozens of patients while experimenting with a new plant."

"Eventually, though," he continues, "the

(Continued to page 240)

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witch doctor or itinerant healer may happen upon the right dosage. He has no inkling why his potion works. Nor does he care. Regardless, he may have stumbled upon one of those not-so-rare flukes . . . a positive, even startling, medical discovery."

Mission doctors in East Africa, for example, concede that a native remedy for tapeworm compounded from the ekyinyaraba plant "is as good as anything we have—and maybe a bit better."

Recently, plant hunter Don Overton, of the College of Medical Evangelists, returned from Colombia with a home remedy brewed by the Guahibo Indians. The Guahibos regularly sniff the stuff—a compound of dried yopo berries and pulverized snail shells (calcium)—claiming it improves vision, immunizes against jungle fever and cloaks its user in a protective trance.

Lab dissected, the Guahibos' unsavory potion has already yielded five new organic substances. At least one is being tested as a "truth serum."

Rauwolfia Is Typical "Discovery"

As typical, perhaps, was the case of the Indian plant rauwolfia—the common snakeroot—which even Gandhi is said to have dunked in his tea to calm his nerves. Chewed, the plant's snakelike roots had for 30 centuries quelled fits of nervous depression among natives of India and Africa. No less than one million Indians regularly used the herb.

Yet, not until 1931 did Western researchers take serious notice of the pink-flowered shrub. When they did, they discovered (only in 1952) the source of its "magic"—a chemical called reserpine, contained mostly in the root. Result: Tranquilizers, perhaps the decade's most sensational new family of mental drugs. Marketed under such trade names as "Serpasil" and "Reserpoid," \$30 million worth of reserpine-based drugs—generally used to treat diagnosed psychotics—are annually administered to the bothered and bewildered.

Says a drug company executive somewhat lamely, "We finally figured that one million Indians couldn't be wrong."

Concedes a top researcher, "We've come full circle. Back in the 1800s, fully 80 percent of all medicines were plant derived. Gradually, researchers turned more and more to chemicals, both organic and inorganic. Today, half the curatives in the average family's medicine cabinet are products of somebody's test tube. And only 30 percent are plant based."

"Now?" he shrugs, "Now, almost out of desperation, we're going back to nature . . . back to plants. For good as the test tube is, it hasn't cured man's greatest cripplers

(Continued to page 242)

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—arthritis, heart trouble, insanity, asthma and cancer."

Sometimes a plant will point the way to the development of a synthetic that has a medical application. For example, it has been known for some years that native Mexicans eat certain mushrooms because they produce visions or hallucinations. Researchers have now developed a synthetic substance, Psibocybine, which duplicates some of the beneficial effects of the mushrooms and which they hope will be useful in the treatment of schizophrenia and other mental illnesses.

"Plant hunting isn't for sissies," says lean, muscular Dr. Farag, remembering a skin-drenching, fever-ridden trek he made deep into Tanganyika—a trek which ended in a tantalizing dead-end.

Schizophrenic Apparently Cured

"A mission doctor," recalls Dr. Farag, "diagnosed a tribesman's illness as schizophrenia, a mental disorder that afflicts millions the world over. Modern medicine has no sure cure. But to the doctor's amazement, a native healer not only treated the man but returned him within a short time to apparent sanity."

Dr. Farag set out with a guide. They found the witch doctor drunk, a gourd of home-brewed banana beer in one hand and violence in his eyes. Point-blank, he refused to part with his secret. A week later, Dr. Farag tried again. But again the witch doctor ranted violently—and refused, for any amount of money or even for a cow, his usual curative fee, to divulge his secret.

"The thing haunts me," confesses Dr. Farag. "We know that one patient was cured by whatever it was the fellow used. And, though we always take with a proverbial grain of salt even the most locally renowned of native cures, you never know—until you've put a plant through the research wringer."

Another thing that haunts plant sleuths: A promising plant which, though once located, can't be found again.

"The fault," explains a researcher, "lies usually in identification. With a rare, often unclassified plant, a sleuth may fail properly to tag it with its family, genus and species. Or, worse, fail to pinpoint exactly where—within an acre—he found it."

Even as plant detectives push into equatorial Africa, through the wilds of South and Central America and across the Middle East, other botanical sleuths are literally rooting through your garden and mine.

At the University of Arizona, botanists are putting to the medical test every plant that inhabits desert America. Their quest: A cure for cancer.

(Continued to page 244)



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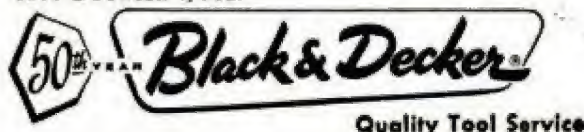
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On the same trail, too, is a research team headed by Dr. Alfred Taylor of the University of Texas. Reports cautious Dr. Taylor, "We've never had as much success with chemicals invented by man as we're having with plant extracts."

Backed by a grant from the U.S. Public Health Service, Dr. Mervin Hardinge, at California's College of Medical Evangelists, is tackling the near impossible: Dissecting for their medical secrets *every* plant that grows in California. During the past three years, Dr. Hardinge and his staff have managed literally to take apart more than 1500 California plants—and with some startling results. A half dozen at least show "high activity" and definite effects upon cancer in laboratory animals.

Oregon Plant Shows Promise

The "most promising" cancer plant yet to come under Dr. Hardinge's scrutiny—a plant he won't name just yet—is a native of Oregon.

"One of our faculty members was vacationing in Oregon," explains the scientist, "and brought this plant back... partly on a hunch, partly because local folks had for years used it as a medicine. Tests show it to be highly active. In fact, it shows real signs of inhibiting the growth of some cancer cells. It'll take years, perhaps, to prove its worth—and safety—for human patients. But right now we're putting the plant to the medical test with better than anticipated results."

Natural plant cures for cancer, long scoffed at by researchers, are being seriously investigated by the National Cancer Institute. The Institute's Dr. Jonathan Hartwell is right now deep in a monumental perusal of ancient literature—including translations of Egyptian medical scrolls which date back 3500 years. He's already turned up two cancer-promising plants: The juniper tree and American mandrake, both of which appear to destroy cancer cells in test animals.

Even a tiny fungus—one that's small enough to grow on the bodies of dead insects—seems to have promise as a weapon against cancer. Nicholas Kredich, a junior at the University of Michigan medical school, is currently working with a product of the fungus, a chemical called cordycepin. Part of his research involves the injection of cordycepin and other compounds into mice with cancer to see if the combination can halt growth of cancer cells.

The fact is that almost every plant in your garden has, one time or another, been used—and prescribed—as a local remedy, if only to treat sunburn. What's more, it's

(Continued to page 246)

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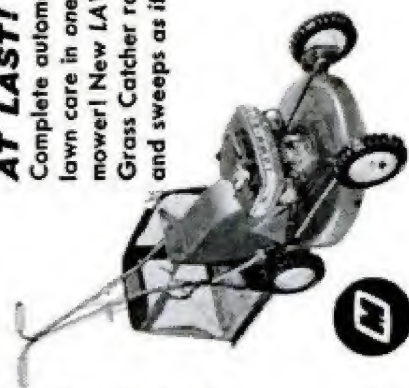
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Ask your LAWN-BOY dealer for a free demonstration on your own lawn. Look him up in the "Yellow Pages" under Lawn Mowers, or write LAWN-BOY for name and colorful free booklet.

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Manufacturers of LAWN-BOY power mowers, rotary tillers, edger-trimmers, snow removal equipment.

AT LAST!

Complete automatic lawn care in one modern mower! New LAWN-BOY Grass Catcher rakes and sweeps as it mows!



a safe bet that growing within a dozen miles of your home, city dweller though you may be, is a plant which, incredible as it may seem, has escaped the botanists.

Explains one plant hunter, "Back in the 1850s, only a mere 6000 of the 350,000 plants we know to exist today had been examined and classified. Even today, some 4000 'new species'—new to botanists, at least—are yearly added to the list."

Skeptical? Well, only last spring—in nearby Baja California—a staffer from Scripps Institution of Oceanography eyewitnessed the curative powers of a startling "new" plant.

The scientist's guide, a native of Mexico's desert domain, severely cut himself. As blood flowed, he ambled almost nonchalantly to a nearby—and yet unidentified—shrub, plucked a few of its leaves and laid them over the wound. Almost immediately the bleeding stopped. No drug known today comes close to duplicating this feat.

But you don't have to discover a new plant. Medical researchers want *any* plant with a local record for curing.

Suppose some local folks are fond of chewing on the stem of plant X. And while maybe neither you nor the others can prove it, plant X seems, at least, to settle that too-full feeling after Sunday supper.

The fact that plant X is a generally accepted home remedy puts it on the plant hunter's "most wanted" list. What researchers want is a brief note, describing the plant and telling locally what it cures.

Your library, for example, can help tag the plant with its all-important scientific name. "Local" names merely confuse researchers because some plants have dozens of nicknames. If a librarian can't help, maybe a high school botany teacher can. Or, your town may have a botanical garden, whose staffers know their plants.

What we need to know, at least, is a plant's *genus* and *species*," explains a plant detective. "Black mustard, a common plant, goes under the scientific name of *Brassica*, its genus, and *nigra*, its species. Discuss this plant as a local curative and you'd begin by saying, 'the black mustard plant, *Brassica nigra*'."

Letter Triggers Research

Not so simple, however, is the research your letter triggers, once it arrives in the plant detective's mail. The botanist neatly pigeonholes your plant in its proper niche—both botanically and medically.

Then the bibliographer—a kind of botanical librarian—sets to work. His job: To search through medical history, to see what other claims have been made for your plant. He may discover that the Egyptians used the plant for upset stomachs, too. Or,

that Maya legend attributed other cures to the same plant. Gradually the file builds.

If the botanist hasn't a specimen of your plant, you may be asked to ship a few samples. Generally, you're expected to dig the plant up, being careful not to injure roots, stem, leaves, flowers or seeds. Uprooted, the plant's put out in the sun and allowed to dry. When all but brittle, it's carefully sandwiched between blotters and shipped to the botanist. Sometimes, once dried, the plant is dissected. You literally take it apart, putting in separate bottles or containers its various parts: Leaves, stem, flowers, roots, seeds, etc. And you label each bottle. Example: "Stem, black mustard, *Brassica nigra*."

At the lab, scientists set to work armed with a phalanx of research tools: *Grinders*, which reduce the plant's parts to the consistency of milled wheat; *chemicals*, including acids, which dissolve out or separate the raw plant extract, which may contain upwards of 200 substances, known and unknown; *electrostatic machines*, designed to isolate substances electrically; a *counter-current distributor* whose complex net of glass tubes separates compounds which are soluble; and finally, an *infrared spectrophotometer* which, when a plant's vital and pure ingredients are found, double-checks them for purity.

It's a little like panning for gold—for a golden, perhaps revolutionary, medical discovery. The plant's raw substances, like raw pay dirt, are chemically dissolved until every *known* substance is washed away. Finally, there remains only the pure extract, perhaps a chemical or crystal never before put to the medical test.

Injected into cancerous test animals, for example, it may have no effect whatever. But in one case out of 100, it may prove "active"—may slow up or inhibit, although slightly, the growth of cancer in the animal.

A cure for cancer? No, merely a promising inhibitor. For hundreds of equally promising substances have proven, when finally tested on humans, to have dangerous or even deadly side effects. So, again, the search starts literally from scratch . . . to find an extract which, slowing the growth of cancer cells in animals, proves both effective and harmless to man.

Will plant hunters and their research teammates find curative plants which fight cancer, arthritis, or heart trouble?

Medical researchers are hopeful. Once, they remember, there was no drug called digitalis, nor a tranquilizer named reserpine nor a hundred others like them which today are lifesavers. Meantime, the secret search for miracles goes on relentlessly—across five continents, the seven seas . . . and even in your own back yard. ★ ★ ★

TIRE FACTS THAT CAN SAVE YOUR LIFE



ONLY ARMSTRONG TIRES HAVE PATENTED INTERLOCKING SIPES

"SIPES" are the slots put in a tire's tread to give more gripping edges, to stop skidding. Armstrong's interlocking, S-shape siping (see magnified view at left) provides grip in ALL directions, gives you sharply improved protection against both forward and side skids.

AND UNLIKE tires which have siping just cut into the tread, Armstrong siping is *molded in*, deeply. Long after the mileage that wears away the shallow siping of ordinary tires, Armstrong siping continues to give you full protection. Safeguard your car against deadly skids . . . compare, and see how Armstrong gives you far more siping than other leading tires.

ONLY ARMSTRONG TIRES HAVE PATENTED SAFETY DISCS

*—Grip the road to
stop deadly skids
as no other
tires can!*

ARMSTRONG TIRES



TREAD STAYS OPEN

Like fist above with discs between fingers, tread CAN'T squeeze shut. Hundreds of Armstrong Safety Discs hold tread's gripping edges open, always ready to "bite."

ORDINARY TIRES



TREAD CAN CLOSE

Without discs, tread CAN squeeze shut, like fist above. Tire's gripping edges are pushed together, lose their grip. Even brand new tires can go smooth like this . . . and you skid!

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Home Office, West Haven, Connecticut

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\$5⁴⁹

True Temper's
ROCKET hammer
seems to have a
vitality all its own.
Grip it: it's as secure
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were gripping back.
Heft it: the balance is
perfect. Swing it: you'll
feel its comfortable,
shock-absorbing action
while it delivers a power-
centered blow. See this
superb hammer at your
hardware store today.
True Temper, 1623 Euclid
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See the popular JET
ROCKET sportsman's
axe, too—the head
just can't fly off. \$5.25.
With leather sheath, \$6.25.

TRUE TEMPER®
THE RIGHT TOOL FOR THE RIGHT JOB

1926, for instance, a British steamer came upon the remnants of an iceberg 170 nautical miles south of Bermuda. The ice chunk had been reduced to 30 feet by 15 feet and rose only three feet above the ocean surface, but it was still big enough to slice open the side of a ship.

The number of icebergs found in North Atlantic shipping lanes averages 425 a year, but varies surprisingly. In 1912, when the *Titanic* was lost, there were 1019. In 1924 there were only 11. But 1957 was a bad year—nearly 1200 icebergs were spotted, though none, for some reason, reached the main shipping lanes. In 1958, by paradox, only one berg was sighted below the northerly 48th parallel; there was not even an ice patrol that year.

Last year proved to be a potential troublemaker. In April the number of bergs suddenly jumped to 266—almost three times that month's annual average of 95. May became critical because the ice not only penetrated the northern steamship Track C (Charlie Track); it also went into the more southerly route, Track B (Bravo), always considered safe after April 11. It was in this track that the *Titanic* was sunk. The ice congestion caused transatlantic traffic to be rerouted south to Track A, where ships were last assigned in 1946.

Then in May a big berg turned up even in the "safe" emergency route. Somehow, in thick fog that had grounded Coast Guard aircraft at Argentia and in spite of the probing radar of Ice Patrol cutters, the berg had sneaked through. How many ships had swept past it in dark of night or in fog or blinding storm probably never will be known.

The report of the presence of the iceberg had the same effect on shipping as would a disclosure that an armed killer was loose in your own home. In a bad ice area skippers sometimes heave to and drift when darkness falls or thick fog closes in. However, a majority of ship captains, including the late skipper of the *Titanic*, decide to plow along regardless of fog, darkness and ice. The Ice Patrol has no jurisdiction over the decisions of these captains if they choose to jeopardize their ships to maintain a transoceanic schedule demanded by their steamship lines.

In at least two cases, at night, an Ice Patrol cutter has had to send visual "Iceberg Dead Ahead" signals with blinkers to vessels whose wireless operators apparently were off duty. In another case the cutter *Androscoggin* had to turn its searchlight on an iceberg before an oncoming ship would change its course.

These vessels were freighters, but at
(Continued to page 278)

POPULAR MECHANICS



...extends Spark Plug **"PRIME OF LIFE"**



Comparison Proves Special Duty Advantages

The usual extended tip spark plug (left) has a long ground electrode that can burn or wear away under severe operating conditions.



The new AC Fire-Ring Extended Shell Spark Plug has the short, sturdy ground electrode design that reduces vibration, burning and breaking off, assures superior performance.

Every AC Fire-Ring Spark Plug features the exclusive Hot Tip that heats faster, cools faster to stay clean longer.

***They must be
the best!***

AC FIRE-RING SPARK PLUGS



Here's the newest of the new for car owners requiring extended tip spark plugs — an *extended tip* spark plug with an *extended shell*.

This revolutionary new shell design offers all the advantages of the extended tip design, plus greater efficiency during the spark plug's peak power period — or "Prime of Life." It permits a shorter ground electrode that reduces power-robbing misfire and electrode wear. It fully protects the insulator tip to shield it during starts and prevent "drowning," after false starts.

You get faster, surer starts and cleaner burning full power performance throughout the entire life of the spark plug.

If your car calls for extended tip spark plugs, ask for this newest development — new AC Fire-Rings with *extended shell*.

AC SPARK PLUG  THE ELECTRONICS DIVISION OF GENERAL MOTORS

AC PRESENTS THE ART CARNEY SHOW,
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APRIL 1960

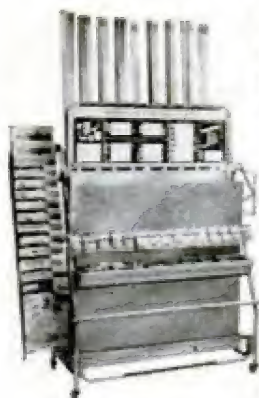
249

Give your son's **GO-CART** the sleek aluminum look



made easy with Reynolds **DO-IT-YOURSELF ALUMINUM**

Aluminum hood, grill and fittings make the slickest Go-Cart on wheels. For either push or powered car, Reynolds rust-free Do-It-Yourself Aluminum lasts ages without painting. Finish easily in an afternoon using common woodworking tools and free plans (see coupon).



Look for this rack at most hardware and building supply stores. Over 73 items—

sheets, tubing
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Reynolds Metals Co. • Richmond 18, Va.
Please send your Do-It-Yourself Aluminum
How-To booklet with free Go-Cart plans.

Name _____

Address _____

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Dept. PM

Swimming Pools

(Continued from page 164)

and give more water to treat and heat. In areas close to the manufacturer, precast concrete pools give another practical method. The precast walls are joined to a poured concrete bottom, giving a good solid pool.

Some companies and many self-builders have eliminated the wood forms of poured concrete pools by "dry-packing," Fig. 8, using a fairly stiff concrete mix which is shoveled and packed in place by hand, almost like plaster. Such a pool shell can be rounded the same as a Gunited pool; has more strength that way. The shell needs to be extra thick because the dry-packed concrete has low density and strength. Most Gunited, poured and dry-packed pools are finished off with a white calcareous-base plaster coat (contains marble dust instead of sand) which gives a lifetime finish to a pool kept clean and filled year-round. Applying this special finish is tricky and requires an experienced pool plasterer. Ordinary plasters containing lime will disintegrate under water and should never be used.

Concrete-block construction has been used satisfactorily for pools. At a glance, the construction seems easier to do yourself than poured or dry-pack concrete but it actually is more difficult because the blocks must be very carefully laid and reinforced to prevent cracks. Concrete blocks give a weaker pool shell than concrete and should not be used on filled ground or elsewhere where subject to any disturbance. For the same reason, most block pools are finished with a heavy vinyl liner rather than a plaster finish. The cost, contracted, of a fully-equipped pool is about 10 to 15 percent less than for a gunited pool.

A vinyl-lined pool with a sand bottom and shallow sides reinforced with poured concrete, concrete block or wood gives you a "real" pool at the lowest cost. One builder of custom-made Gunited pools has do-it-yourself vinyl-lined kits available. A kit for a 20 x 40 ft. pool costs \$1320; \$870 for a 16 x 32 ft. pool, and \$700 for a 12 x 27 ft. pool. The kit includes a double-thickness vinyl liner made to size, a complete sand or diatomaceous-earth filter, the pump required, and all pipe and fittings needed. You supply the hole and lay the plumbing and liner. Such heavy vinyl linings have a life expectancy of at least 10 years and can be replaced. While the lining can be pierced by a sharp object, to patch any but a small break does require emptying the pool. Fig. 12 shows a half-sunk construction that is easiest for a vinyl-lined pool.

(Continued to page 254)



handiest glue around the house

Speedy squeeze bottle. No muss, no fuss. Dries fast, clear and strong! From furniture to scrap-books, best all-purpose glue you can buy. Send stamped, self-addressed envelope for Free copy of "Elmer's Guide to Good Gluing". Write The Borden Company, 350 Madison Avenue, New York 17, N. Y.

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CUT ANY SIZE — ANY SHAPE
WITH **Spearhead Cutter**

Handy pocket size — cuts leather, asbestos, rubber, cork, etc. — round 1/4" to 6" — any size straight and odd shapes.

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Pound for
pound the
finest hammer
ever made

STANLEY
"STEELMASTER"...\$5²⁵



You feel it the moment you lift it. The grip, the balance, the all-steel power instantly tell you, "This is it!" Buy one. It will serve you well. Here's why: *tempered rim* minimizes chipping; *locked-on head* will never come loose; *chrome alloy handle* has built-in flex, absorbs vibration, won't rust; *contoured grip* is cushioned for comfort, won't slip or mar.



Stanley Tools • Division of The Stanley Works,
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A distinctively styled Cushman scooter, with its dynamic performance and safe roadability puts a new lift in your life. And there's more: A Cushman scooter provides today's most economical transportation—takes you anywhere for less than a penny per mile.

- Dependable Husky 4-cycle engine
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INSURANCE**

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The smart
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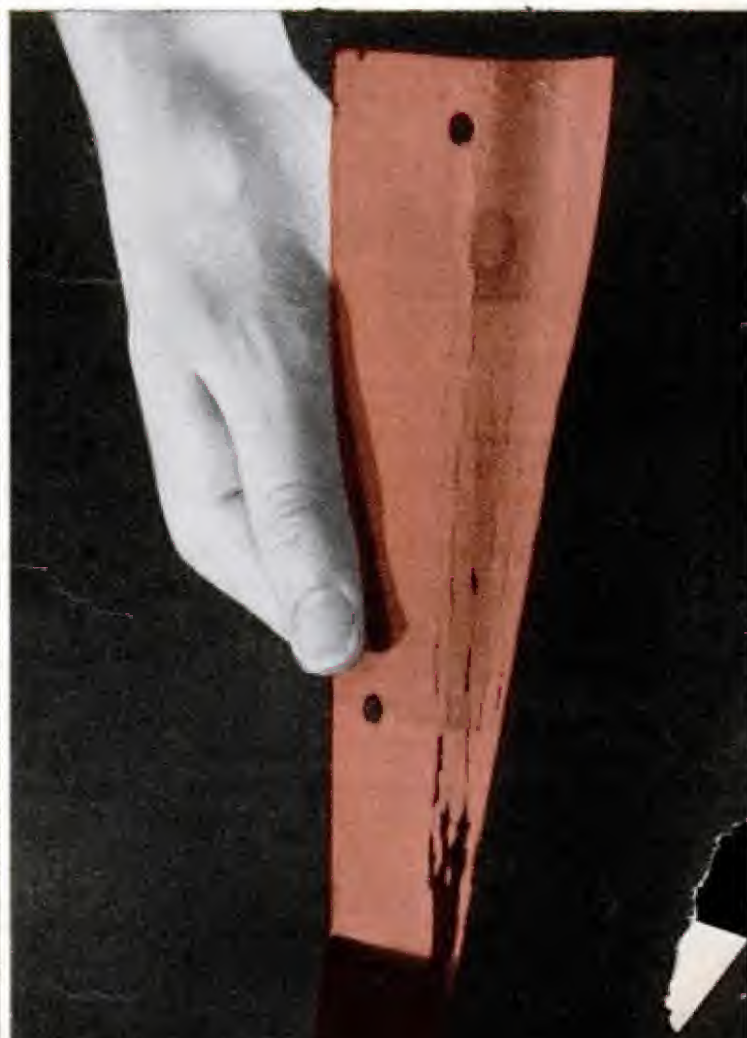
A subsidiary of Outboard Marine Corporation,
maker of Johnson and Evinrude outboard motors

Please send Scooter booklet.

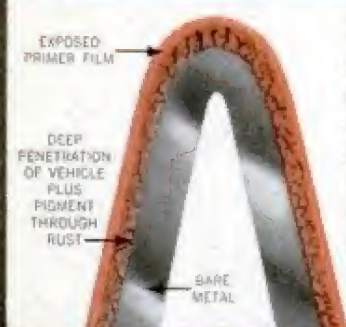
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NEW PAINT PROVIDES POSITIVE

PROOF!

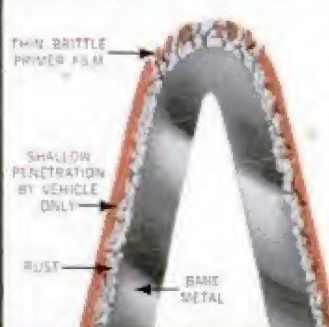


RUSTMASTER PRIMER



Deep-down RUSTMASTER penetration produced flexible film which bonded directly to bare metal. Film remained intact despite rupturing of rust layers by bending.

ORDINARY PRIMER



Thin, brittle film cracked and broke away from the surface as panel was bent. Poor penetration performance resulted in improper protection of rusted metal.

Here's why industry prefers RUSTMASTER

Rusted metal panels were coated with primers and finish coats and exposed to weathering test at 95 degrees and 95 per cent humidity for 300 hours (equivalent to approximately one year of exterior exposure). Both panels were then subjected to severe bending. Conventional paint cracked and broke away from the surface. RUSTMASTER showed little sign of stress, revealing far greater penetration, endurance, flexibility and adhesion.

PROTECTION AGAINST RUST!

RUSTMASTER penetrates deep down into metal pores; forces out corrosive moisture and air
THE INDUSTRY-PROVED PAINT FOR HOME USE

RUSTMASTER, the paint developed to combat the \$6 billion annual corrosion losses of industry, can now beautify and lengthen the life of metal surfaces in and around your home.

PAINT RIGHT THROUGH RUST! **RUSTMASTER** can be brushed on right over rusted surfaces—provides positive protection.

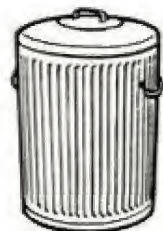
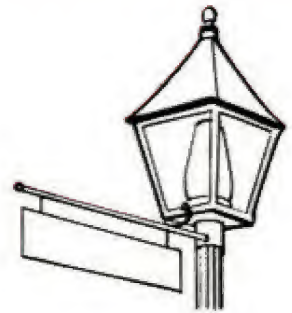
Secret to the remarkable protective action is a special surface wetting additive. Operating on a principle similar to modern detergents, **RUSTMASTER** is able to penetrate right through rust layers to the metal beneath. Hidden pockets of corrosive moisture and air are forced out.

RUSTMASTER PRIMER is easy to apply by brush or with the convenient spray can. It dries overnight, ready for finish coat.

Insist on the finest in metal protection. Ask your paint dealer for **RUSTMASTER**, the paint proved in industry. Primer and nine attractive colors are available plus **RUSTMASTER GALVANIZED PRIMER** for aluminum and galvanized metal.

EASY TWO-STEP RUSTMASTER SYSTEM

1. Apply **RUSTMASTER PRIMER** to wirebrushed rusted surface or clean metal. Let dry overnight.
2. Apply **RUSTMASTER FINISH COAT** in color of your choice.



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time
for a
TREND,
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TREND

MILD LITTLE CIGARS

...with new *Trend-Air* conditioning

No time for a big cigar—but you'll always have time for a Trend... long enough for complete satisfaction, short enough to enjoy *anytime*. New Trend-Air conditioning "breathes" just the right amount of cool, fresh air into the smoke stream for maximum mildness. 100% cigar tobaccos clear through. Enjoy rich, mild cigar taste *plus* cigarette size and convenience—try Trend, today.



And you need
not inhale
to enjoy them!

Humidor pack of 20 **35c**

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... with new *Trend-Air* conditioning!

STEPHANO BROTHERS (Cigar Division) Phila. 7, Pa.

PIONEERS IN MODERN CIGARS

You place the retaining walls only about halfway down in the ground and use the excavated earth as a fill to secure the sides.

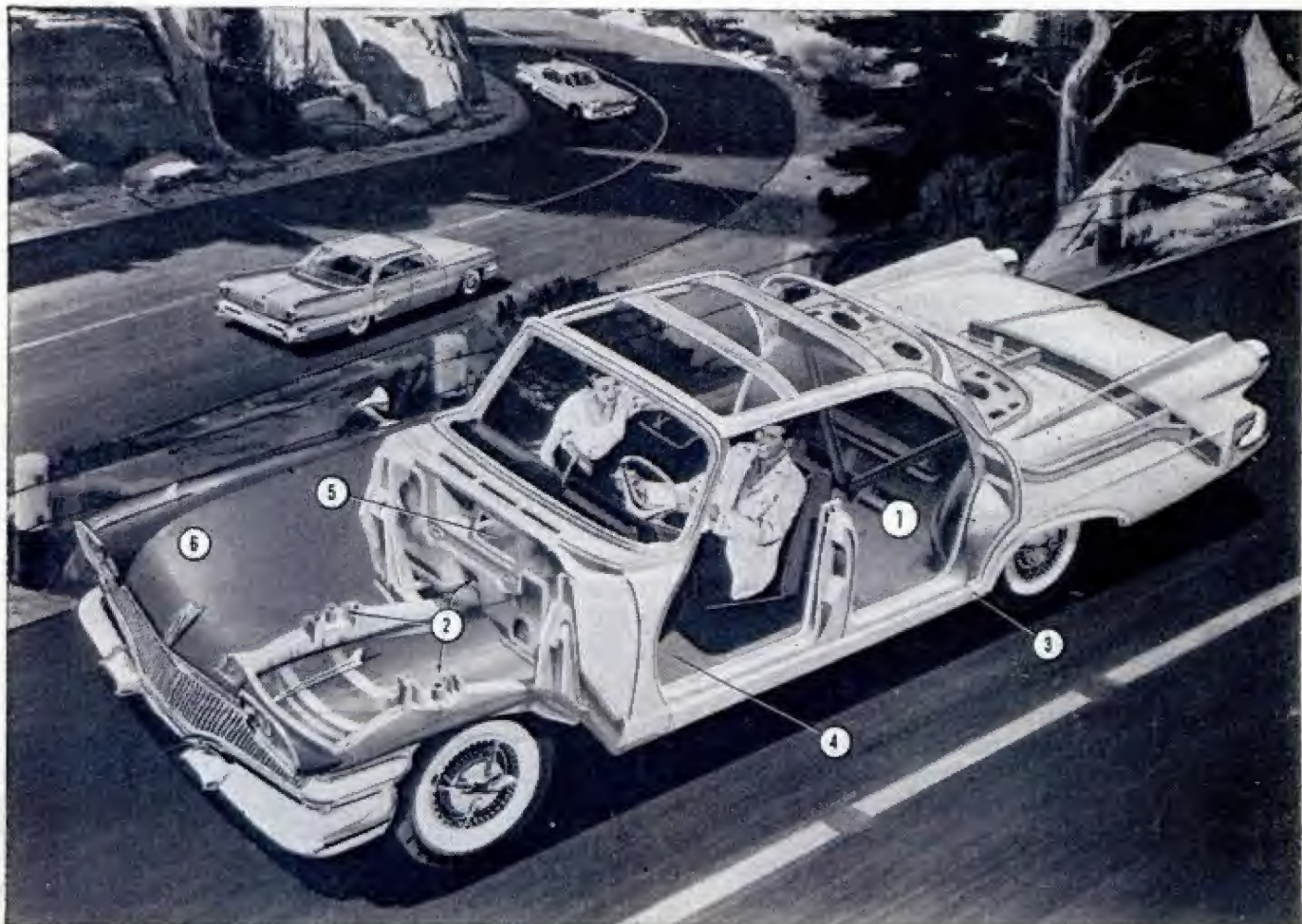
The larger portable "splashing" pools of about 3-ft. depth allow some swimming, and are available today at a cost as low as \$200 to \$300 complete. They are simple to erect, are filled and emptied with a hose and can be stored away in winter. Some more permanent types are sunk halfway into the ground, like a plastic-lined pool. Similar pools have been built by simply digging a rounded hole and lining it with heavy asphalted roofing paper. As on a roof, the laps of the paper are sealed with asphalt and all is finished with a roofing paint, preferably one with an aluminum base. Such a sunken pool will hold water and is very inexpensive if you build it yourself. However, it is easily damaged and the most difficult of all to keep clean.

Your swimming pool can operate either as a fill-and-draw or recirculating type. A fill-and-draw pool works like a bathtub. It is filled with water and then drained, scrubbed and refilled whenever necessary. Because algae can form in as little as three days time in summer, this refilling and cleaning can be quite a chore, requires a large source of water and usually is practical only in rural areas where water is cheap and can be used afterwards for irrigation. Some owners chlorinate their fill-and-draw pools and thus the water will stay clear for weeks, but getting rid of the chlorinated water is a problem in most yards because it kills vegetation. Running a small stream of fresh water continually through the pool seldom is successful because it usually is not enough to keep the pool clear, gives a cold pool and does not allow any chlorination. Some good fill-and-draw pools along seacoasts use salt water pumped from the ocean. For such, a good idea is to expose the piping and paint it black so the sun will warm the water before it enters the pool.

Almost all permanent pools built today are recirculating and the larger portable plastic pools, which are fill-and-draw, usually are made recirculating sooner or later by adding a portable pump and filter unit. In any recirculating pool, the water is pumped through a filter system and then a heater, if included, and back into the pool. Surprising to many people is that the same water is used for years—a closed circuit—adding only the little lost to evaporation and backwashing of the filter, and that amount will never show on your water bill. After filtering, the water is much clearer than when it comes from city mains. Its purity is easily maintained and the filtered pool does a good part of its cleaning automatically.

(Continued to page 256)

Dodge Dart Is Sound-tight, Weather-tight, Built To Stay Tight!



There are many reasons why Dart rides and feels like it costs hundreds of dollars more than it really does. To build this new kind of low-priced car, Dodge engineers used a striking series of important advances never before available in the low-price field.

1. UNIBODY CONSTRUCTION—Dart eliminates conventional two-piece body-frame construction. It's welded into a single unit with stressed-strength. One-piece construction eliminates body squeaks and rattles. It's far stronger to begin with—and it stays that way.

2. FREE-FLIGHT POWER—New three-point suspension cradles engine in space—actually floats it on supple steel coils and rubber blocks. Sound and vibration are completely isolated from passengers.

3. SPECIAL WEATHER SEALING—All body seams and joints are shiplapped to prevent leakage. Seams are further sealed with a special

gun-applied mastic that stays pliable—won't dry out or crack with age.

4. NEW SOUND-DEADENING TECHNIQUES—Under hood, roof, and floor mats, heavy layers of special felt and rubber acoustical materials soak up road and wind noise. These sound deadeners are eight times as effective as the best of conventional sprayed-on materials.

5. SPECIAL SEALING FOR WIRES AND CONTROLS—Instead of punching separate holes in the firewall for entrance of control cables and wires, Dodge engineers routed major units through an ingenious self-sealing keyhole. There, special die-cut rubber blocks simultaneously position the wires and seal out drafts and noise.

6. COMPLETE RUSTPROOFING INSIDE AND OUT—Every Dart Unibody is deep-dipped seven times in tenacious rust preventives. This deep-dipping completely seals every crack and seam, inside and out. Final finish is then added—two coats of special primer, two coats of lustrous, long-lasting Lustre-Bond baked enamel.

AMERICA'S FIRST FINE ECONOMY CAR

DODGE DART



NOW DODGE BUILDS TWO GREAT CARS: DODGE DART • '60 DODGE

Fig. 6 shows a completely equipped recirculating pool using a sand-and-gravel filter. The pump draws half its water from the lowest point in the pool, half from the surface skimmer. Thus it constantly "drains" sediment from the bottom and skims leaves and pollen from the surface. Leaves are caught by the skimmer, smaller particles by the pump strainer and dissolved dirt, etc., by the filter. The water then passes through the heater, if included, and back to the pool through one or more openings, preferably at the shallow end so that the flow will sweep most of the bottom.

Note the number of valves. They let the system do several things. As shown in Fig. 6, the system is operating normally. To power a pool vacuum cleaner, you simply close skimmer valve No. 1 and bottom drain No. 2, then open valve No. 3 in the vacuum-cleaner line. The opening for the latter is located below the water line so air cannot enter. There are four valves for the filter. To backwash and clean the filter, you close valves No. 5 and 6 which are normally open, and open valves No. 4 and 7 which are normally closed. The pump then forces water in at the bottom and flushes the collected debris out the top of the filter and on to waste in a dry well or sewer line. If your pool gathers a large amount of dirt from a storm, you can bypass the filter and vacuum the dirt directly to waste by opening valves 4 and 5 and closing valves 6 and 7. Some new filters have a single four-way valve which accomplishes the same as the four valves shown.

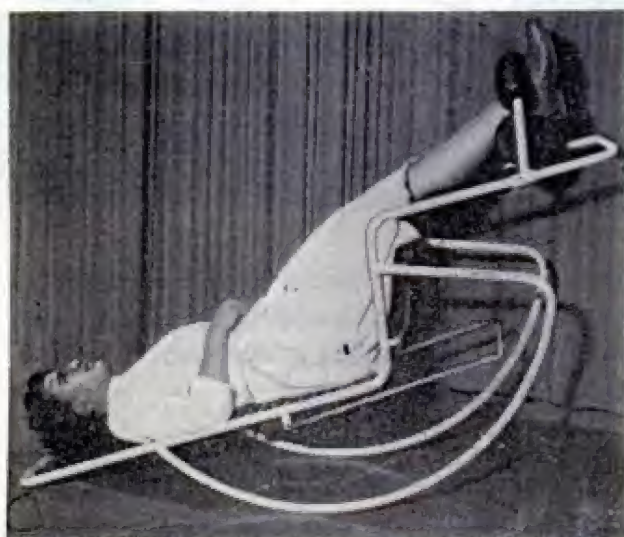
The latest versions of diatomaceous-earth skim-filters are as efficient as the sand-and-gravel type and of special interest to anyone building his own pool, because they include built-in skimmers and eliminate much of the plumbing ordinarily required. These compact filters are installed directly alongside the pool shell as is a separate skimmer. Some include the back-flushing and vacuum-cleaner features of a sand-and-gravel filter and require for maintenance only a handful of diatomaceous earth added each week. Some others use replaceable filter cartridges. This type of filter, or the separate skimmer of a sand-and-gravel filter, should be located on the side or corner of the pool where the prevailing wind most often deposits floating debris.

The left-hand detail in Fig. 6 shows the action of a modern skimmer. It is a large plastic tube with a ring-shaped float in the top so the tube will just barely float and will be sucked down about $\frac{1}{2}$ in. below the water level whenever the filter pump is operating. Thus, water is drawn off the

surface only, along with any floating material, regardless of daily changes in the pool level. The skimmer moves up and down inside a perforated metal basket, which catches the leaves, etc. The 1-in. pipe with rubber flap valve is included to prevent the pump from drawing air if the water level should fall below the skimmer's inlet and to let it draw a full flow if the skimmer basket is clogged with leaves.

In the past, a pool heater was considered a definite luxury but today three out of four permanent pools have heaters. One will raise the water's temperature to well over 80 deg., and, more important, will do so in early spring and late fall. In most climates a heater doubles the months you will use your pool. A modern pool heater is not cheap, costs from \$400 to \$600, depending on your pool's size, and from \$10 to \$25 for fuel each month of full operation. House water heaters cannot be used because they will not heat water constantly passing through. The flow of the filter pump needs to pass fairly slow through most pool heaters. Therefore, a bypass line with a valve usually is included there, Fig. 1, so you can adjust the amount of the flow through the heater.

(Continued next month)



Eduard Munz & Co., 6 Friedenstr., Wuerzburg, West Germany

Rocker Applies Traction

Lying on a row of rollers, the patient on a West German spinal-therapy apparatus undergoes traction on his body simply because of his own weight. The device, which resembles a rocking chair, tips backward until the patient is inclined, head downward, to a maximum of 20 degrees. The patient's feet are secured. Thus, as his weight causes his body to slide along the rollers, the desired traction is applied over the entire spinal column. The patient can roll the device upright by himself.

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30 Tools



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Do the job *better* because power attachments are driven direct from the engine by splined steel shafts and gears. No belts or chains to slip, wear or break. More power *at the working tool*!

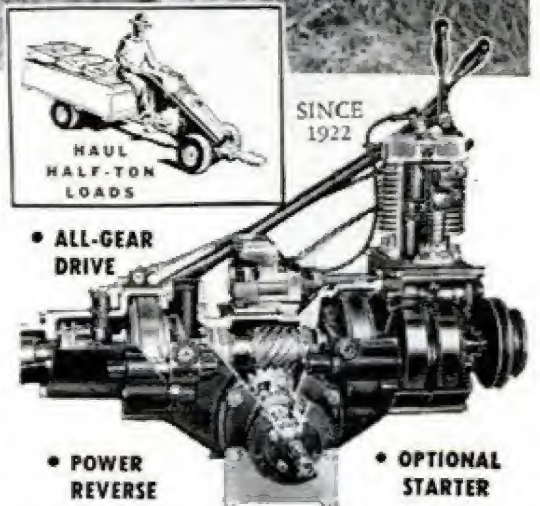
A FREE demonstration by your local sales and service representative will show you, beyond doubt, that the Gravelly and its attachments will do your jobs *better, faster, easier*. Compare. You will see that you get *more power, more performance, more for your money!* . . . Available on installment plan.

WRITE FOR FREE 24-PAGE BOOKLET!

Big, 24-page illustrated booklet, "Power vs Drudgery", shows how the Gravelly solves your lawn and garden problems . . . Write for it today!



FREE! MAIL NOW



• ALL-GEAR
DRIVE

• POWER
REVERSE

• OPTIONAL
STARTER

Power attachments *securely* mounted by only four bolts. Balance, easy handling, simple controls. Cutaway view shows Gravelly's clean, compact, power-engineered design — the reason for its remarkable performance. Make the wise choice — choose Gravelly!

GRAVELLY TRACTORS, INC.

P.O. BOX 601-D

DUNBAR, W. VA.

Please send "Power vs Drudgery" Booklet and dealer's name to:

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**2
New**

RIGID Tubing Cutters

Give you Grooved Rollers for close flare cut-offs... no waste! Also, Enclosed Feed Mechanism • Spare Cutter Wheel in Handle •



RIGID No. 205 Tubing Cutter

Time-Saving, Slide-to-Size $\frac{1}{8}$ " to $2\frac{3}{8}$ " O.D. Capacity

Made of lightweight, high-strength cast aluminum alloy, you'll find these new RIGID Tubing Cutters extra handy. Slight push on handle of large-size-range RIGID No. 205 snugs cutter wheel against tubing... locks it in position until released. Feed screw fully protected and enclosed... always feeds into tube with easy handle turn... can't jam with chips or dirt. Wheel gives quick, clean cuts of copper, brass, aluminum tubing and thin-wall conduit... no burr. Grooved rollers give easy flare cut-offs without tubing waste. Tubing always turns freely on 2 of 4 Rollers. Rollers smooth tubing ready for soldering. Fold-in reamer always handy. Spare Cutter wheel in handle. Wheel for plastic and aluminum pipe available for No. 205 only.

Conform to Fed. Spec. GGG-C-771b Type II—
Class I—enclosed feed mechanism

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Protected Feed
Screw Always
Easy-Turning
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Capacity

Save time on home maintenance and workshop projects; get a RIGID Tubing Cutter from your Dealer today!

RIGID

The Ridge Tool Company • Elyria, Ohio, U.S.A.

Revolutionary Engine

(Continued from page 97)

chamber through a side-wall port. As the engine's rotor turns, the mixture is compressed and fired by a single spark plug. The exploding gases deliver the power to the crankshaft through the rotor. Exhaust fumes escape through another port in the chamber wall.

There are three power sequences per revolution to the crankshaft, maintaining an almost continuous intake, compression, ignition, expansion and exhaust cycle.

Made of iron and steel, the engine can deliver one horsepower for each pound of its own weight; made of lighter metals, the ratio may reach one horsepower for each half pound of weight. Engineers predict rotating combustion engines of up to 10,000 horsepower.

Liquid or Air Cooled

Other advantages that are claimed for the revolutionary new engine include the fact that it can be liquid cooled or air cooled; it has no compression ratio limitation due to hot spots; acceleration is extremely rapid; no torque is developed by offset parts; an ice-cold engine can be opened to full throttle in two minutes; and at maximum revolutions per minute there is no power loss or high progressive fuel consumption as in reciprocating engines. The fact that there are few moving parts, too, leads to a longer life for the engine.

Felix Wankel was by no means the first inventor to attempt to build an engine with a revolving piston. As he points out, James Watt, inventor of the steam engine, tried some 200 years ago to drive a sort of revolving piston engine with steam. Wankel investigated the many engines that were attempted by inventors seeking to perfect the revolving piston principle and gradually filled the "gaps" until he arrived at the present configuration with the unique triangular rotor.

One of his greatest problems was that of sealing the individual chambers formed by the sides of the rotor and the chamber walls. The inset metal strips at the tips of the triangle finally were developed as a solution to the problem.

Simplicity of the rotating combustion engine and the absence of "exotic materials" will be factors that will keep the engine low in cost, say its developers. They are directing developmental efforts into all fields of transportation, including automotive, marine, commercial aircraft and vertical-take-off aircraft, and into such industrial applications as compressors, generators, pumps, farm implements and large-volume earth-moving equipment. ★ ★ ★

LOT OWNERS!

**DON'T WAIT FOR HIGHER INTEREST
RATES OR EVEN "TIGHTER" MONEY!!!**



Each PARAGON HOME is CUSTOM-CUT to your order!

*You can build this lovely home on your land NOW and save up to 40% using
our proven sub-contractor system—more if you do part of the work yourself.*

Available in FOUR different sizes and floor plans; two with double baths. Beautiful interiors, large closets, center halls, separate dining rooms, picture windows, fireplace, 24" overhangs. All interior trim, wallboard, oak floors, choice of roof shingle colors, etc. down to the last nail.

Paragon Pre-Cut Homes feature douglas fir framing exclusively. No prefabricated panels. Paragon guarantees all materials to complete the job as specified. Because Paragon Homes are pre-cut they can meet all building and zoning specifications.

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No closing or inspection fees
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cabinets and most other improvements
available and financed by Paragon.

*Brick as shown optional at extra cost.

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3 Bedroom Ranch



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Pioneer 2-8200 • Fieldstone 3-3900



This point lets you bore holes up to 1½" with small electric drill

It's hollow ground to bore cleaner, faster at any angle

NOW YOU CAN increase the boring range of your small electric drill or drill press. New Irwin Speedbor "88" bits bore faster, cleaner holes up to 1½" in any wood. ¼" shank chucks perfectly. No wobble, no run-out. Sharp cutting edges on Irwin exclusive hollow ground point start holes faster, permit spade-type cutters to bore up to 5 times faster. All Irwin Speedbor "88" wood bits are forged from single bar of special bit steel, tempered full length and machine-sharpened for extra accuracy, longest life. 17 sizes, ¼" to 1½". Buy individually or in sets from your Irwin hardware or building supply dealer.

Only 75c each, sizes ¼" to 1"
Only \$1.25 each, sizes 1½" to 1½"

IRWIN SPEEDBOR "88" WOOD BITS
 at Wilmington, Ohio, since 1885



BUILD 'EM YOURSELF

TEENUTS®

and **EASI-BILD® PATTERNS!**

TEENUTS... the flush-mounting, "can't-slip" nut that needs no washer... is now specified in 10 popular Easi-Bild patterns! Get them both at Hardware, Variety and Lumber stores!

*T. M. Reg. U. S. Pat. Off.

Columbia Fastener Company

Chicago 8,
 Illinois

Nose Count, 1960

(Continued from page 117)

ages to the nearest zero below the truth."

For the coy one who says she is "over 21," the census taker has a stock trick. "Very well," he says, eyeing her, "I'll put you in the 55-60 group." That usually gets the accurate age in a hurry.

Most people recognize the importance of accurate reporting once the enumerator explains that representation in Congress, old-age benefits, government planning for roads, schools and hospitals, business planning for new outlets, industrial production and many other vital national functions depend on the integrity of individual reporting. It's not unusual for a housewife to walk miles to a district office in order to correct her age, which she has falsified "because my husband was home when the census taker asked me, and I didn't want him to know I am older than he is." Or for a man to correct his income "because my wife doesn't know about the other \$2000."

When the enumerator stops at your house in April, he will pick up the form you received in the mail and check the answers with you. These will be blocked out on a FOSDIC form in a special code arrangement of black squares. At every fourth home, he will leave another form with 45 questions. This is a "sampling" survey of housing, which recipients will fill in themselves and mail to the Bureau, detailing such things as education, occupation and marital status of every member of the household, the number of television sets, cars and so on. Averages struck from this spot check will provide census officials with an accurate picture of the standard of living and the direction it is taking.

Most enumerators will wind up their rugged tour in 10 days, making one special "T-night" roundup of wanderers in trailer camps, motels, lodging houses—and an "M-night" survey scouring the skid-row missions, flophouses and hobo jungles. In spite of it all, they expect to miss an estimated 2,000,000 people, as they did last time.

When the enumerators are finished, the real job begins. From some 400 temporary field offices, 2150 tons of paper—enough to fill 100 boxcars and to print an average Sunday edition of *The New York Times*—will pour into census headquarters as they always have. But there, similarity with the past ends.

Keeping one jump ahead of its ever-burgeoning job has been a specialty of the Census Bureau ever since 1880 when it took seven years to complete a 22-volume report on a mere 50,000,000 Americans, using

(Continued to page 262)

New Du Pont LUCITE® House Paint adds years of beauty... saves real money



"Lucite" makes the difference...and only Du Pont makes "Lucite"

Outstanding durability, superior blister-resistance, easy application make Du Pont "Lucite" the greatest house paint discovery in 30 years.

OUTLASTS ORDINARY PAINTS. Du Pont research chemists tested new "Lucite" Acrylic House Paint for years in all kinds of weather, in all parts of the country. Result: proof that "Lucite", applied according to directions over Du Pont Blister-Resistant Primer, can actually last 50% longer than conventional house paints.

COMBATS BLISTER PROBLEM. Moisture blistering, once the homeowner's most serious problem, has been solved. Tests show that "Lucite" over Du Pont Blister-Resistant Primer, on new wood or old surfaces from which the paint has been removed, effectively resists blistering.

GOES ON EASILY, DRIES FAST. Never before has an exterior house paint been so easy to apply. New "Lucite" flows on without effort. Dries quickly. Ideal for wood and masonry surfaces.

Send for new 12-page booklet, "How to Get Extra Years of Beauty from Your Next House Paint Job." Write Du Pont Finishes Div., Dept. PM-64, Wilmington 98, Delaware. Or ask your Du Pont Dealer. He's in the Yellow Pages of your telephone directory.

*Buy the paint that's worth
the work...the beauty lasts*



*Better Things for Better Living
...through Chemistry*



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TRANSLUCENT FIBERGLASS BUILDING PANELS



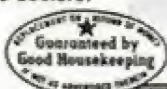
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Guaranteed FILON, the do-it-yourself dream material! Add low-cost comfort plus the beauty of color-softened light. For patio roofs, carports, fences, glowing ceilings, room dividers.

Now! Exclusive THERMOBLOK Colors for maximum comfort under the sun.

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tedious hand methods. By then the 1890 census was already in the making. The first innovation, invented by one of the Bureau's own men—Dr. Herman Hollerith—involved transferring information from the census-taker's sheets to paper cards, in the form of punched codes.

But for the 1960 decennial census, even punch cards were too cumbersome and time consuming. The result is FOSDIC—an electronic wizard that was under development even before the last card was filed in the 1950 countdown.

Here's how the new system will work: Before FOSDIC can digest the masses of information on each of the enumerators' 60 million work sheets, they must be micro-filmed. So, first stop for these bales of paper will be the census offices at Jeffersonville, Ind., where a battery of 30 cameras will reduce each tabloid-size sheet to a crystal-sharp picture half the size of a four-cent stamp. By the time these cameras have finished their continuous grind, 950 miles of 16-mm. film will have clicked through their shutter gates.

As fast as it is processed, the film will speed to Suitland, and be fed into the electronic maws of five humming FOSDICs. Basically, FOSDIC is an electronic scanner, similar to a television camera. An electron beam in its single cathode-tube "eye" scans two work sheets simultaneously, sweeping across them in a series of lines. But instead of transmitting what it sees in light and shadow signals, like the lines on your TV screen, the enumerator's black circles that the "eye" picks out on the work forms are converted into magnetic pulses on a magnetic tape.

Since FOSDIC's eye can be instructed to examine only certain sections of a form—such as the "male" squares, or the "single family dwelling" circles written in by the enumerators—you can begin to understand the significance of these devices.

As fast as the magnetized tape spews from the FOSDICs, it is fed through one of a battery of four giant UNIVAC (Universal Automatic Computer) brains. UNIVAC is really the core of the census miracle. This is the nerve center that, once instructed, digests the magnetic information from FOSDIC, analyzes it, and produces requested answers in orderly fashion on a new magnetic tape. If, for instance, UNIVAC is told to tabulate the number of male household heads from the FOSDIC tapes, the big brain will sample the magnetic pulses, decide on a "yes" or "no" basis which ones qualify, and store in its memory only those that do. The incredible brain makes each decision in 17-millionths of a

(Continued to page 264)

LIFT 3 TONS 9" IN 30 SECONDS! Complete HYDRAULIC LIFT KIT

- For Lift Trucks • Fine for Snow Plows,
Disc Harrows, etc. • To Tip Farm Wagons
- Hydraulic Presses

KIT CONTAINS:

1) **HYDRAULIC PUMP** with 24" handle, 2 qt. oil reservoir, adjustable release valve, filler plug, 3/4" P.T. port, Universal mounting holes — Pump rated 1500 P.S.I., .80 cu. in. per stroke.
No. G-1500P . . . Shpg. wt. 15 lbs.
F.O.B. Chgo. \$29.50

2) **HYDRAULIC HOSE ASSEMBLY** — 8 ft. long, wire braid constructed. Rubber jacket, smooth neoprene core. 3/4" P.T. male fittings.
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3) **HYDRAULIC CYLINDER** — 2 1/4" bore, 9" stroke, 1 1/2" piston rod stainless steel. Clevis mount, both ends.
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4) **HYDRAULIC FLUID**, 2 qts.
No. G-B11 . . . F.O.B. Chgo. \$1.00

Included in it are fittings, and instructions — just pour in oil, connect hoses, and go to work! It's easy!

SAVE MONEY—ORDER COMPLETE KIT! Items can be ordered separately if desired.

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Constantine's Catalog & Manual for WOODWORKERS

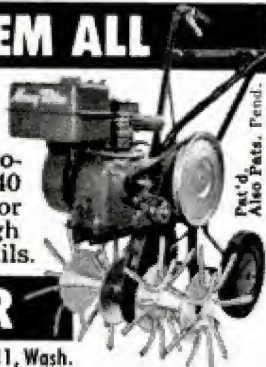
ALL-NEW! 1960 Edition. More than a catalog—a manual, too! 130 pages—exciting new items! Since 1812, world's most complete source for rare imported & domestic woods at rock-bottom prices. Inlays, bandings, carvings, hard-to-find hardware, inlaid wood picture kits, new brass hardware, etc. Plus tools, plans, projects. Enclose 25¢ (refunded on 1st order). Get **FREE** year's subscription to "Chips & Chats" too. Write **NOW!**

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OUTWORKS THEM ALL

Prepares the toughest soils in one operation. All-purpose tiller-tractor tills to 12" deep — 12" to 40" wide. 3 models; 7 rotor styles including mulchers. 40 attachments include all tractor tools, mowers, snow plow. Tough chain-gear drive. Send for details.



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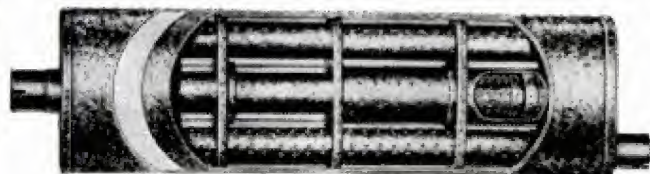
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Penetrates where ordinary oils can't reach. Lubricates from —20° to +200°F. Rustproofs—Best for tools, appliances, guns, etc. At hardware and auto stores, super markets. American Grease Stick Co., Muskegon, Michigan

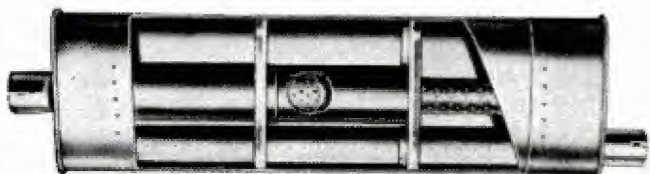


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SILENTONE Standard

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Master The finest muffler your money can buy anywhere. Up to 41% more steel than ordinary mufflers. Rust-resisting design. Double shells. Zinc-coated steel. Asbestos liners. Heavier end caps. If quality is your first consideration, ask to see a Master. It costs no more than ordinary mufflers!

Standard A proud new economy version of Silentone. Though priced for the thrifty, this is no tinny makeshift. It is a heavy, durable muffler, the equal of most higher priced mufflers on the market. That's why we call it Standard.

For a fine glass-packed muffler with a unique quiet power tone, ask about Dynatone—now custom engineered for your car.

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H535

Smoked buc upper treated with Scotchgard (water and soil repellent) leather protector; oil resistant Cellular Grit Anti-Slip sole. Also in grey buc (H546).



Popular feather light brown glove leather Chukka shoe; oil resistant Cellular Grit Anti-Slip sole.



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New women's smoked gore pump; Nitro-Crepe Saf-Tred cemented sole; light, flexible, high-style.



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You Can't Tell Them from Regular Shoes
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second, and reads some 20,000 impulses per second. More than 1000 census forms are read, analyzed and broken down into required bulk statistics by UNIVAC in about five minutes.

Although UNIVAC can't think, it can spot errors and mistakes with unerring accuracy. If, for instance, it stumbles onto a string of illogical facts, such as 55 male heads of households under 10 years of age, it will automatically reject these from its final totals. If a circuit fails, or a series of pulses are missing due to a tape failure, it will make a note of this on its own tape, and the message will be conveyed to the operators of the high-speed printers moments later. To cover all of the wide variety of census statistics, the FOSDIC master tapes will spin through the system over and over again.

Summary tapes from the UNIVACs move on to the electronically controlled high-speed printers, which read their magnetic pulses and instantly turn them into a sort of teletype form that anyone can read. This little whiz can turn out statistical tables at the dizzy rate of 600 lines per minute.

Besides speeding publication of the census reports, the use of these electronic wizards will enable the Bureau of Census to compute many more averages and statistical breakdowns than ever before. Complicated ratios and trend figures, formerly left uncalculated because of the tremendous manpower and time involved, will be duck soup for the UNIVAC 1105.

What's more, plucking a given set of facts from the stored memory films at any time in the future will be simple compared to the handling of endless punch-card files. Microfilm for the entire 1960 population and housing census will be stashed in an area no bigger than your bedroom. Cards from the 1950 decennial census fill an area nearly 200 times greater.

Storage and easy access gets to be a major headache when you realize that the decennial census is only one *more* job for the Bureau, albeit a big one. Actually, census-taking never stops at Suitland. Month after month all manner of special surveys are conducted by mail as well as by armies of interviewers. Many are published in various summaries such as the annual *Statistical Abstract*, in which you can find such tidbits of miscellaneous intelligence as the total number of lady locomotive engineers in 1957, or how many childless male "laundresses" there are today.

There isn't much information about Americans and their business or social enterprises that can't be found stored away in some Bureau survey. Not all of it has

(Continued to page 266)



Weight-saving, welded construction helps the Falcon go up to 30 miles on a gallon of gas.

Why does the Falcon have a welded single-unit body and bolted-on front fenders?

Welded, single-unit construction gives more usable space, great strength, an unusually quiet ride. That means the Falcon can be compact outside and yet carry six big people in comfort. And this *lightweight* method is one big reason why the Falcon goes up to 30 miles a gallon.

Bolted-on front fenders cost less to replace. In fact, just about half what welded-on fenders cost. They speed repair jobs, too, to save you time *and* money! That makes them *right* for an economy car.

It's the same with Falcon's single carburetor that costs half what a dual system costs to replace. And it's much easier to adjust since it does not require synchronizing with a twin.

But a *true* economy car must have fine-car quality to keep resale value high. And that's where the Falcon shines brightest!

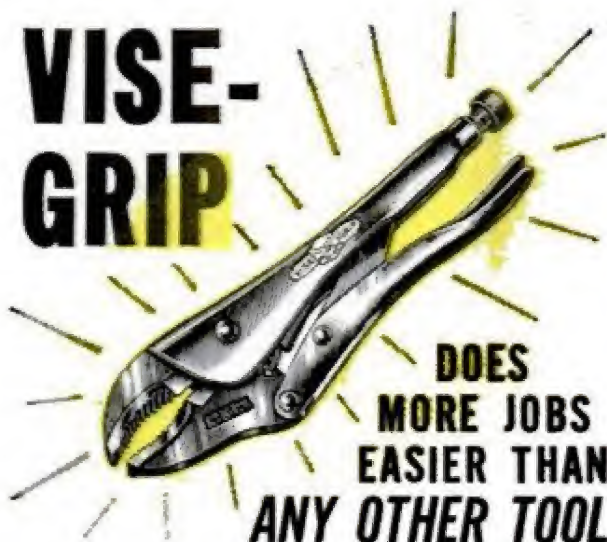
Try these simple quality tests. *Push* your hand against the Falcon's "ceiling." You'll find a deep layer of sound-conditioning material. *Feel* the texture of that beautiful upholstery. *Inspect* the workmanship of each bright metal detail. That's quality you can see and feel.

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and **FULL HORSEPOWER!** Quiet-tone's straight-thru construction for unobstructed flow of gases gives you *both!* Plus the deep "acceptable" tone you admire, thanks to exclusive Turbo-Jet Diffuser. And, because Thermo-Dynamic Heat Flow produces faster evaporation of corrosive exhaust acids, **QUIET-TONE** mufflers last longer!

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... and **ASK** about the complete lines of Dual Exhaust Systems, too.

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World's Largest Producer of Dual Exhaust Systems

been broken down into published statistical tables. But if you or your company had to know, let's say, how many transistors were produced by how many American factories in 1948—and how this compared with Japanese production—the Bureau will run its stored data through the mill for you at a nonprofit fee, provided the job can be squeezed into its busy schedule. On occasion, when the survey concerns something of national interest that they are free to publish themselves, they will even take a private census for anyone willing to pay the cost of labor and equipment time. Many special nose-counts are conducted for cities and towns.

Although individual forms are strictly confidential, any person with a legitimate reason can call on the Bureau to dig out information about himself and his immediate family. Since it started business, the Bureau's Personal Census Service has helped 3,500,000 people to prove birth dates or citizenship for purposes of clearing their right to old-age benefits and legacies.

Usually searchers have only the skimpiest facts to go on. "I was born in Wisconsin during the big smoke;" or "It was the year that big ship sank." So, starting with the date of the big Peshtigo forest fires, or the Titanic disaster, the hunt begins and is often successful. To avoid the hazard of misspelled names, the Bureau has a "Soundex" file in Kansas, coding nearly a quarter of a billion names by the way they sound. An ordinary uncomplicated name, such as John Q. Doe, can be turned up here in a matter of seconds.

All this constitutes day-to-day operations for the Bureau of the Census. The big countdown each zero year is the icing on the cake. The one coming up next month was three years in planning.

Out of it all, in just a month or two, you and I will know a lot more about us. Some of the facts that the new census will reveal have already been projected by the Bureau. They know, for instance, that it's going to show American families growing bigger; that marriageable women are going to outnumber marriageable men by about 2,000,000 in every place but Alaska, where the ratio is five-to-one in the other direction; that Americans are growing younger as well as older, due to rapid strides in medical care and war against disease; that the center of our population will move almost 20 miles further west from its last focal point near Olney, Ill., due to the addition of two new states.

But when UNIVAC has finished gobbling up the actual data, there are bound to be some surprises. ★ ★ ★

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For a home of
ANY TYPE



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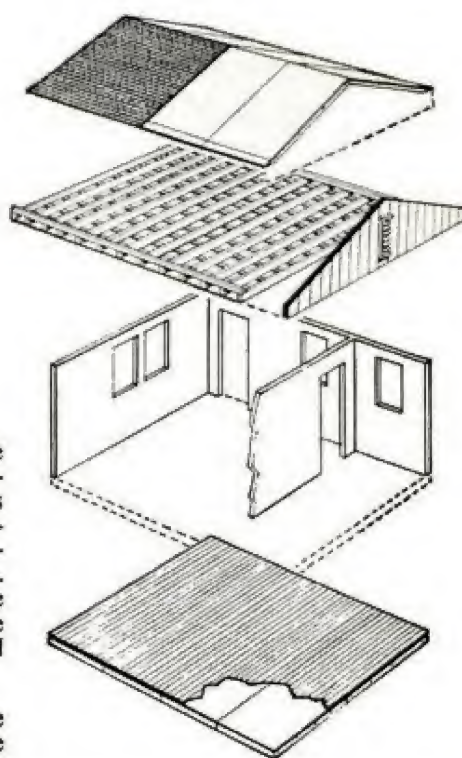
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To build this way, you buy (or have your builder buy) P-B Components from your local lumber dealer. Your walls and partitions are not of some limited, arbitrary length or width, but *room-size*—with either exterior finish

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Write for 8-page brochure. It tells the whole story in full detail, plus the facts about our 24 years' experience with this method of building quality homes with low maintenance costs and high re-sale value. For your *free* copy, address Dept. D-3.



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COMPANY

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HANDY, BIG PLASTIC BOX

24 compartments,
13 1/8 x 9 x 2 1/4.

Beautiful,
crystal clear,
rigid plastic.
Ideal for fish

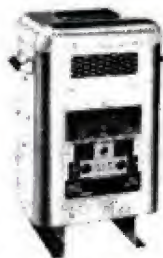
lures, nuts, bolts, washers,
buttons, jewelry, office supplies.
Sturdy cover and hinges. At hardware,
automotive, sports goods stores.

The **Vichrek** Tool Co. Dep't. P
Cleveland 4, Ohio

EMERSON ELECTRIC

PORTARC 180c PORTABLE WELDER High Capacity... Low Price

Ideal for farm, home workshop. Cuts, brazes, solders, welds. One man can carry... only 68 lbs. 6 welding heats up to 180 amps... 1/32" to 3/16" rod sizes. Write today for prices and receive **FREE WELDING SELECTOR GUIDE**... gives working data you need in seconds!



EMERSON ELECTRIC of St. Louis
8100 Florissant • St. Louis 36, Mo.

"finest mower made!"

BIG WHEEL YAZOO



Here's the power mower that's built to take it! Glides easily over rough terrain, weeded area... and clips the finest lawn to smooth perfection! These unbeatable features of Big Wheel Master Mowers make Yazoo tops for every cutting need:

- Big Wheels glide smoothly, mean easy handling!
- Stays in top condition... with minimum upkeep!
- Covers ground faster... stands-up under wear!
- Gives years of efficient, trouble-free service!

See the Yazoo Complete Line at your dealer!

YAZOO SALES COMPANY, INC.

3607 Livingston Rd.
Jackson, Miss.

114 N. Central St.
Gilman, Ill.

Route 59
Monsey, N.Y.

Selecting Your Sound Source

(Continued from page 220)

For many years, only magnetic cartridges were used in the highest-quality systems. Their performance was so far superior to that of the other types that the difference was clearly audible. This is no longer true. With present-day stereo units, the audible differences between a good magnetic unit and an equivalent ceramic one are no more pronounced than the variations between high-fidelity cartridges of the same classification.

The frequency-response curves of three highly rated cartridges, see p. 220, indicate a measure of performance which leaves little to be desired. Yet, they do not sound as much alike as the curves would indicate. Only a listening test can tell you which one you will like best.

There's one thing you should take into consideration, however. Magnetic cartridges are not nearly as efficient as ceramic ones. They require greater amplification and that means a greater hum and noise level in the amplifier. Unless you have a truly high-quality amplifier, a ceramic cartridge would be your best bet.

The Stylus. If you were to ask my opinion as to the most critical part of a modern hi-fi phono system, I'd have to answer

—the stylus. Today's speakers and amplifiers do a creditable job. If they distort the signal, it's generally only at very high volume levels, and if they don't reproduce all of the musical tones, their discrimination is principally against the very high and very low frequencies which constitute only a small portion of the sound. But a worn or chipped stylus affects the total sound. It distorts *all* frequencies at *all* volume levels, and even a single playing with a bad stylus can damage a hi-fi record.

Most of the better stereo cartridges today are sold exclusively with diamond stylus. But there are plenty of others which give you your choice as to diamond or sapphire—and the price difference is appreciable. Now there's nothing wrong with a sapphire stylus if it's in good condition. The trouble is that a sapphire begins to show signs of wear after about 10 or 20 hours of use. It's likely to have passed the danger point before you realize that it's time for a change.

A diamond, on the other hand, gives well over 100 hours of playing time and it more than pays for itself in the long run. An investment in anything but a diamond stylus is truly false economy.

Unless a listening test convinces you that a particular cartridge is clearly

Only Eclipse Mowers



RIDING MODELS

Make lawn mowing almost fun! The Eclipse Deluxe "Ranger" mows up to 5½ acres a day. It's ruggedly built with auto-type tubular steel frame. Has two forward speeds and reverse. Big canvas "Sun-Brella" is an optional accessory... fits on to tow-bar pin at rear of mower. Try it soon at your Eclipse dealer.



REEL-TYPE

Preferred by many who take special pride in their lawns... Eclipse precision reel-type mowers—18" to 25" models—give a smooth shearing action that's ideal for Bermuda, Zoysia, and St. Augustine, as well as blue grasses.

**SEE THE BIG "E" LINE
AT YOUR DEALERS SOON...**

superior to all others, try to select one with a user-replaceable stylus. Though this won't save you any money, it eliminates the necessity for returning the unit to the factory and the subsequent delay in putting it back into operation.

The Pickup Arm. If you buy a changer or a complete, factory-assembled manual player, you won't have to worry about the pickup arm. If you plan to use a professional turntable, however, this is another component you'll have to select with care.

The function of the arm is a purely passive one. It should do nothing more than to hold the cartridge in the correct position as the latter travels across the record. It should be light enough to follow the eccentric variation of the slightly warped records, yet stable enough to resist vibrations which otherwise would cause the stylus to skip grooves. At the same time, its resonance should be low enough so that it does not impose its own characteristics on the reproduced sound.

Properly adjusted and installed, both of the kit-built arms shown on page 220 should perform satisfactorily. There is, however, a considerable difference between the two. While the resonant frequency of both is well below the audio range, the Gray arm required only 1.7 grams of stylus pressure for proper track-

ing. With the same cartridge, minimum pressure for the Audax was 3.5 grams.

Moreover, while it is always a good idea to level the turntable, this is absolutely essential for the Audax arm, while the Gray is somewhat more tolerant. The Audax is also more susceptible to vibrations. Even at tracking pressure as high as 4.5 grams, it still had a tendency to jump out of the groove when vibrations were deliberately introduced. Of the two units, the Gray arm is definitely superior, though it is considerably higher in price, and far more involved in construction.

If proper facilities are available, it would be a good idea to compare the performance of a number of pickup arms before making a final selection. At least, send for manufacturers' literature and compare the specifications and features.

Final Notes. The equipment cabinet described in our January 1960 issue will house all record changers and most commercially assembled manual players. The record-player compartment is too small, however, for the separate professional turntables and arms. If this type of installation is intended, be sure to check the minimum space requirements of the turntable and arm you plan to use. During the initial construction, the dimensions of the cabinet can easily be changed. ★ ★ ★

give you MOW-ABILITY*

ROTARIES

You get power to spare with 4-cycle Briggs & Stratton engines on all Eclipse mowers. Your Eclipse dealer will be glad to show you all the new features that make an Eclipse mower your best buy in the long run. New wind-up starter is furnished on W-20 and W-22 Duo-Masters.

GRASS CATCHER

(Optional extra)

Collects clippings as they leave discharge chute. Easily attached. Fits all Eclipse walking rotary models.

EASY CUTTING HEIGHT ADJUSTMENT



It's brand new and exclusively Eclipse! A simple twist of one control adjusts all four wheels simultaneously. Select any cutting height between 1 1/8" and 3 1/8" —even while mower is operating.



13 MODELS PRICED FROM \$69.95

APRIL 1960

- *DESIGN AND CONSTRUCTION TO OUTPERFORM
- ALL ORDINARY MOWERS YEAR AFTER YEAR —
- FOR THE LOWEST ANNUAL OPERATING COST

RUGGED AS A RHINO

Inside and out—from stem to stern —Eclipse mowers are built to "take it." Many Eclipse mowers 20, 30, or even 50 years old are still on the job and cutting efficiently.



DURABLE AS A CAT

Eclipse mowers seem to have "9 lives"—just don't die easily. To assure long life, repair parts are available for many years after the expected life of the average mower.



POWERFUL AS A BULL

Equipped with job-matched 4-cycle engines, Eclipse gives you a bonus of reserve power. You can operate your mower at safer, quieter and more economical half speed.



THE ECLIPSE LAWN MOWER CO.

Div. of Buffalo-Eclipse Corporation
4014 Railroad St., Prophetstown, Illinois

ECLIPSE

Owners Report on the Falcon

(Continued from page 102)

If you live in a hilly area, you should buy the automatic transmission. → You'll use about eight cents more gas a day, but who wants to shift gears all day for eight cents?

Here's a pleasant week-end recreation. Cheap, too. →

The Falcon does well → in city driving. The heated manifold helps. PM's test car (with automatic transmission) averaged 19.2 miles per gallon in city, 19.9 in high-speed rural-road driving. Temperature was 35 degrees, driver was alone in the car.

In winter (when this survey was made) 20 miles per gallon is good for → any except the very smallest cars. V8s get about eight miles per gallon then.

Falcon owners are not → foreign-car types. Few had imported-car experience. As a group they are more conservative, less inclined to the "off beat" than the usual foreign-car owner. This may have influenced their judgment.

"It rides just like a big car. You hardly feel the bumps." —Wyoming clerk.

Do they have any complaints? Of course they do. Leading the list is the lack of power, the sluggishness that results when a small engine is coupled with a 3.10 rear axle.

"Not enough power. Second gear isn't enough for many hills in town driving and first gear isn't synchromeshed for downshifting." —Tennessee graduate student.

"It should have more power in high. You have to put it in second when you pull into a drive or turn a corner." —North Carolina truck driver.

"Doesn't have pickup in high. You have to stay in low and second longer and go into second quicker on hills." —District of Columbia geologist.

Second on the complaint list is body noise. The Falcon apparently develops rattles despite its unit body.

"The dash panel had many rattles, most of which I eliminated myself with pliers and a screwdriver." —Virginia aircraft mechanic.

"Glove compartment rattles, including what's in it." —Ohio artist.

"Unpleasant body noise at low speed in high gear. Lack of tightness in door windows. Have had one removed for tightening." —Nebraska credit man.

Third among complaints is that the Falcon uses too much gasoline with 5.8 percent of the owners mentioning it.

"I am disappointed in the mileage per gallon. I have never come close to the advertised 30 miles per gallon. I get 22." —New Mexico college student.

"Am a little dissatisfied with gas mileage. I had a 1949 Ford V8 with overdrive that gave the same gas mileage that my Falcon gets. And it ran more smoothly. I get 21.5 miles per gallon over-all." —Tennessee apprentice printer.

"My Falcon has automatic transmission and I average 15.7 miles per gallon." —Ohio maintenance superintendent.

"I was hoping for at least 25 miles per gallon. I get about 20." —Vermont music supervisor.

What About the Imports?

Will the new compact American cars cut into sales of foreign cars? PM asked the Falcon owners what they thought. The answer was overwhelmingly that they would, with only 9.4 percent saying the imports would not be hurt by this new breed of automobile.

Here are some typical comments:

"Most anyone would prefer to buy anything made in U.S.A. even if it costs a little more." —Tennessee fire fighter.

"I buy a car for transportation, not prestige or show. I do not go for snob appeal associated with owning things labeled 'imported.'" —Virginia personnel officer.

"I have had trouble getting service on foreign cars. Most mechanics don't care to work on them. Tuneups were available at the dealer only and often quick service was impossible due to the rush of business." —New Hampshire appraiser.

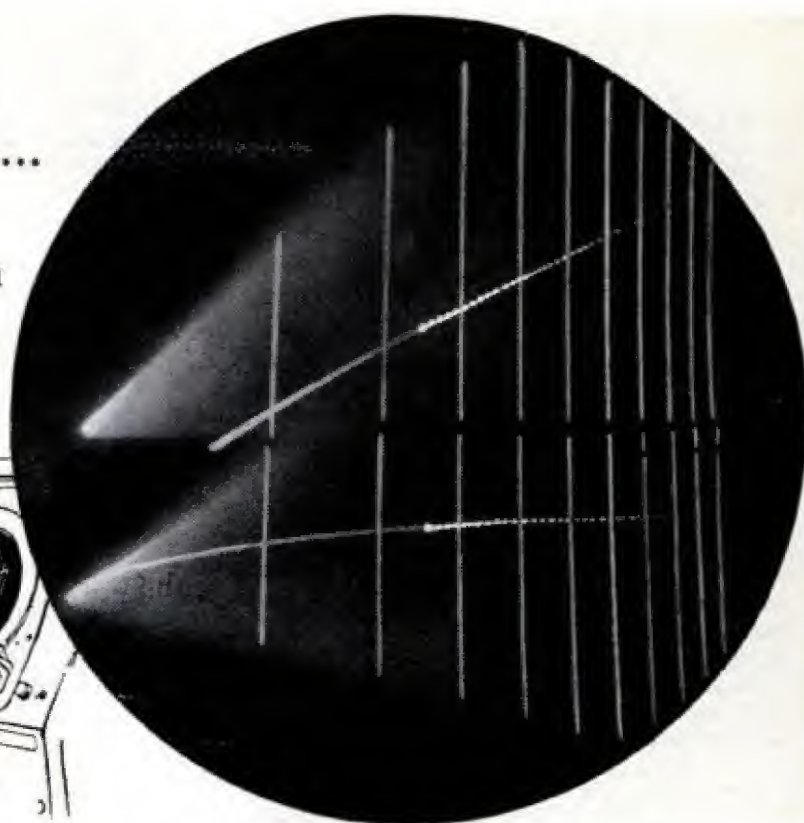
"I have driven several foreign makes and to me none of them looked like an automobile." —Nebraska insurance man.

"I do not like foreign cars but I am grateful to them because they have educated Detroit into building practical automobiles." —Maryland sailor.

And here's the view of the minority:

(Continued to page 272)

"Zero-five-seven...you are fifty feet above glide path... increase your rate of descent... you are now on course, on glide path...over touchdown point...take over visually for landing and contact tower."



YOU MAY HANDLE A SITUATION LIKE THIS...

If you measure up to the Aerospace Team

The man in command of this situation is an Air Force Ground Control Approach Radar Technician. And those "blips" on the glide paths of his radar screen represent an aircraft coming down blind through bad weather. This is the kind of man whose dependable skill and calm judgement make him a key member of the Aerospace Team...he is the kind of man who can meet the qualifications of the U. S. Air Force.

Are you that man? As a trained and ex-

perienced Air Force technician, you will have an opportunity to build a career for yourself in the Aerospace Age—the age of air and space travel. Such a career offers you valuable training and education, steady advancement and an assured future.

If you are the kind of young man who could learn to handle situations of increasing responsibilities, we of the Air Force would like to talk to you. If you are interested, just clip and mail this coupon.

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Here's why the Big Three plans smaller cars for the future. The demand is inevitable. →

Workmanship can be a fetish. I like it. You like it. But its value is mainly psychological. A car runs just as well even though trim doesn't fit right. But somehow if it doesn't fit right, you lose confidence in the whole machine. →

The wheel turns easily, but lots of winding is required. It has the slowest steering ratio of all compacts. That's why it's not frisky in any sense of the word. →

A company has a choice: Put money in engineering innovation or put it in fancy interiors. Ford put it where it shows. →

If you know how to use it, a hand choke is great, but let a woman wrestle with it and the car may never start! →

"My first American car in five years. I had hoped that in this time Ford had caught up with Europe. In 5000 miles this Falcon needed new transmission, valves, crankshaft. I am not a hot rodder either, but do considerable road travel. It does not hold a candle to VW or Renault and they are \$400 cheaper."—Florida general contractor.

"Compacts won't affect foreign-car sales because so many women desire small, easy-to-handle-in-shopping-center cars. Also men must drive 15 to 30 miles to work each way."—Virginia technologist.

"I believe that the American car builders should study some of the foreign cars and compare them with their own. Maybe then we could get a good small car built in this country."—Ohio tool and die maker.

"My husband is planning to trade in his car soon and will buy either another Falcon or a VW. We like our Falcon but do not think any American small cars have the workmanship that some foreign-made cars possess." — North Carolina physician's wife.

More Best-Liked Features

The following quotations describe additional best-liked features, in order of frequency of mention by the owners:

"I like the styling without all that chrome cluttering it up."—Vermont clerk.

"Styling incorporates the very best features from two higher priced models. Falcon has the Thunderbird's cowl and hood and Lincoln's sculptured sides."—Ohio railroad telegrapher.

"I am six foot eight inches tall with my hat and shoes on. This is the only car I ever owned with ample head and leg-room."—Nebraska auctioneer.

"Parks very easy, pulling into a meter or pulling out from one."—North Carolina meat cutter.

"I like the advantage of seeing directly down in front of the car. Visibility all around."—Colorado rancher.

"Very nice size. Not too much overhang and so very easy to maneuver."—Rhode Island railroad clerk.

"It weighs only 2260 pounds but holds the road at high speeds better than all others. Takes short curves at greater speeds."—Maryland building inspector.

"Upholstery is as good as in our 1959 Galaxie."—Tennessee real estate man.

"Large luggage space for a small car."—Idaho airman.

"Ease and accessibility of all parts to be repaired or replaced."—Ohio service station.

"I'm a big man and getting in and out many times each day can be done with ease."—Colorado insurance man.

"I am 73 years old. It is so easy to get in and out."—Wisconsin retired owner.

"I think the balance between power and economy is best where it is. I like the 3.10 rear axle. I use second gear in passing. Acceleration in this gear is excellent up to 55 miles per hour."—Virginia realtor.

"After much shopping (I talked with eight different dealers) I bought the Falcon \$300 cheaper than any competitive make with same equipment."—Ohio life insurance underwriter.

"Best body Ford ever made on a low-price car."—Ohio aircraft flight engineer.

"We like the hand choke on these cold 25 below mornings."—Maine postal carrier.

"It's built so high you don't scrape bottom on bad roads."—Ohio construction superintendent.

(Continued to page 274)

The cool way to go!



Coleman SNOWLITE Coolers and Jugs



These handsome new refreshment holders are record holders, too!

Coleman SnowLite Coolers hold cold **45% longer**. Most efficient coolers under the sun! Leakproof white Royalite liner won't pick up odors, can't rust. Easy to clean. Plastic bead foam insulation all around. Rugged baked enamel casing. Rust-proof, scuff-proof Royalite base. 3 models. 7 and 14-gallon capacities. Pink, green or charcoal.

Coleman SnowLite Jugs hold heat or cold up to **115% longer!** Why? Because they're the only jugs that are 100% insulated from neck to base. Tough Royalite base won't scuff or rust. Exclusive "pitcher-pour" (1 gal.) or nylon-faucet models (1 and 2 gal.). Patio pink or green.

At hardware, sporting goods and department stores.



FREE BOOK!

"Happier Vacations" by motor-travel experts George and Iris Wells. Useful information for hunters and fishermen. Ask your dealer or write for Catalog 081-PM

Other Coleman Outing Products

Floodlight Lanterns Folding Camp Stove
LP-Gas Picnic Stove Sportmaster Stove
Folding Camp Stool

The Coleman Company, Inc., Wichita 1, Kansas

And the Other Complaints

Here, also in order of frequency of mention, are the additional complaints of Falcon owners:

"Very poor alignment of doors. Paint seems to be very thin. Not as well constructed as higher price cars."—Nevada teacher.

"Exterior welding particularly around taillights and trunk is not finished well. Even after two touchups of paint, rust is forming rapidly. Many rust spots."—Florida housewife.

"Don't like the stepping down to get into it and the stepping up to get out."—Vermont construction worker.

"Engine takes too long to heat sufficiently at city speeds to get full usage from heater."—Tennessee business machine serviceman.

"Not enough power on hills. Needs higher rear-axle ratio for this area."—West Virginia clerk.

"Will not drive under 25 miles per hour unless in second gear. I work on a military reservation where there are speed zones of 15 miles per hour. My car heats up in this gear when driven slowly for long distances."—North Carolina ward attendant.

"Wheels are too small and the car tends to bottom on dirt roads."—Ohio tool dresser.

"A lot of sunshine in the face. Windshield should not be so high. Have to use sun visor 90 percent of the time in daylight."—Ohio office manager.

"Don't like slowing down of wipers during acceleration."—North Carolina physician.

"At 25 miles per hour it bucks in high and at 10 miles per hour it bucks in second. I haven't been able to shift to low without a complete stop."—Nevada plumber.

"Steering wheel should be higher for more knee room in getting in and out."—Florida chiropractor.

"Dealer service department is exceedingly poor. Mechanics are parts replacers and lack real diagnostic ability. I make this statement as one who has been in the service field for over 25 years."—Colorado realtor.

"Serious leaks during rainstorms."—Florida engineer.

"I damaged the rear-end gear. The dealer claims to have ordered new gears to replace the damaged ones. Two months have gone by and he has not been able to get them yet. Could it be that the Ford Motor Company made a new car and forgot to make any spare parts or did I select the wrong dealer?"—Rhode Island railroad employee.

"Engineers goofed when they fixed the instrument panel so the light reflects directly against the windshield at night. I have to turn off the instrument lights."—Idaho service station operator.

"Glove compartment too small."—Maryland lecturer.

"Has a tendency to yaw in a stiff quartering wind."—Arkansas Air Force pilot.

"On icy roads it is almost impossible to drive. About like a pup on a new linoleum."—Nebraska manager.

"Front end should be more stable. Brakes squeak and pop when you stop and back up."—North Carolina salesman.

"Gas intake pipe is so low that the gas backs up quite a few times when you stop for gas."—District of Columbia auditor.

"Please build this car a little more sporty so people can get more pleasure out of it."—Florida pantry man.

"Considerable noise from wind at speeds of 55 miles per hour and up."—South Carolina engineer.

"Front wheels do not seem to hold balancing well. Have had wheels balanced twice in 6500 miles."—Ohio salesman.

(Continued to page 276)

Seems to be a styling fault. Falcon looks like a pregnant roller skate with wheels too small for the body. Other compacts have same size wheels and don't give this impression at all. →

There's really no excuse for wipers that stall on acceleration. That is when you need them most. →

Amazing how faults like this get through. The reflections on the inside of the windshield are annoying and dangerous at night. →

In a year, the back end of the Falcon will carry an ugly stain from spilled gas. →



PROTO UNIVERSAL IGNITION SET—NO. 3200C—everything you need for fast, professional-grade work on any ignition system. Includes eight 15° x 60° offset Midget Open End Wrenches, Gap Gauge Set, Midget Plier, Tungsten Point File, Aviation Type Screw Starter, and Screwdriver. In roll-up/hang-up vinyl-treated kit. Separate pockets keep tools organized. At your Proto Hardware and Auto Parts Dealers.

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Comforting Facts about **WOLVERINE WORK SHOES**

WOLVERINE SHELL HORSEHIDES
ARE THE LONGEST WEARING...
EASIEST WEARING WORK
SHOES YOU CAN STEP INTO



WOLVERINE'S 50 YEAR OLD SECRET
TRIPLE TANNING PROCESS KEEPS
THESE TOUGH SHELL HORSEHIDE
LOGGER BOOTS SOFT



THEY CAN TAKE RUGGED WEAR, TOO,
AND GIVE YOUR FOOT PLENTY
OF MUCH NEEDED PROTECTION



EVEN IF YOU SPEND DAY AFTER
DAY IN THE MUD, WOLVERINE WORK
SHOES WILL NOT HARDEN OR CRACK
...BUT WILL DRY SOFT & FLEXIBLE

**PLUS THESE COMFORT
FEATURES—**



Sweat Proof Leather Insoles
• Triple Ribbed Steel Shank • Tapered
Backstay • Outside Counter Pocket,

WOLVERINE
ROCKFORD, MICHIGAN

SERVICE OXFORDS
WORK SHOES • BOOTS
SAFETY SHOES

Miscellaneous: If you're the type who likes the conservative, the tested, this car is for you. It's ideal for the guy who wants dependable, easy-to-service transportation. And it rides well on good roads (not so good on rough ones), is quiet at normal speeds (wind noise is bad at high speeds). Acceleration is poor. Economy in city is good. At high speeds, not so good. Visibility unexcelled. Dash instruments are simple, easy to read, but markings on the gas and temperature gauges are ridiculous, make no sense at all. A great family car for America's workingmen, it's the car the Ford would have become if somebody hadn't convinced the industry that the automobile was a way of life.

"Rides nicely on rough roads, but a long ride on concrete with many cracks and ups and downs does make one weary." —Wisconsin priest.

Finally, here are some quotations that, while they do not represent an important percentage of owners, are of such interest that they are worth repeating:

"If Detroit took more pains in finishing an auto, there would be no foreign competition."—Virginia soldier.

"Have found that 24 pounds of air in the tires lowers gas mileage, but gives a better ride."—Florida radar technician.

"Most women can change the small tires easily and my kids can see a drive-in movie from the back seat without sitting on their knees."—New Mexico electrician.

"Since purchasing my Falcon I've driven 6200 miles during which time I have had no desire to drive my 1959 Star Chief Pontiac."—Ohio salesman.

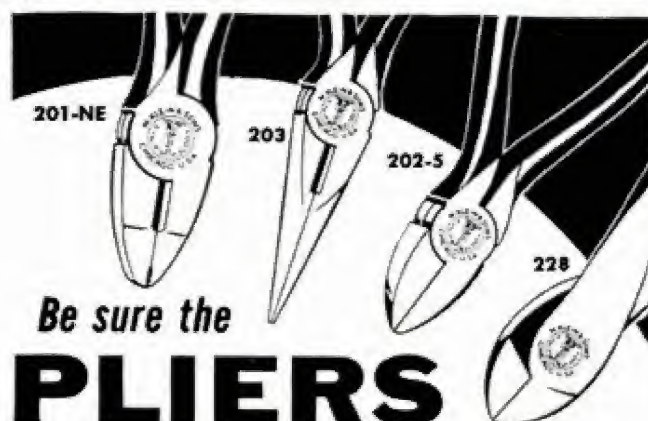
"Service department is highly disorganized. Appointments mean nothing. But I would buy from dealer again because of favorable deal I got. I can have normal maintenance performed conveniently by reliable service station."—Wisconsin claims adjuster.

"Fuses are hard to get at to replace." — Idaho salesman.

"Harder to see around cars in traffic in a low car."—Vermont housewife.

"Not loaded with chrome and other costly items. It is 100 percent small car with 100 percent big-car comfort."—Florida airline pilot.

There you have it—the good and the bad. Here's a car that is satisfying a higher percentage of its owners than any American-built car surveyed in this series. Only the German Volkswagen did better. Obviously, if you are interested in a compact, you should investigate Falcon. ★ ★ ★



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"Since 1857" the name Klein has stood for the finest in tools. Linemen, electricians and good workmen everywhere prefer Kleins because of the high standard of quality that is back of every pair. Now Klein Pliers are available in a wider selection of styles and sizes than ever before.

Ask your supplier for genuine Klein Pliers or write for a new Klein Plier Catalog.
FREE Klein Plier Catalog. On request.

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Established 1857 Chicago, Ill., U.S.A.
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Everything for the Craftsman!

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WOOD
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Finest Domestic and Imported Woods
... Mouldings, Hardware, Tools ...
ALL AT LOW MONEY- SAVING PRICES!

Your complete wood buying guide and project book. Craftsman is your best, most complete source of finest kiln-dried domestic and rare imported woods, beautiful wood inlays, colorful bandings, matched plywoods, embossed mouldings, carved ornaments, newest woodworking tools, "hard to find" cabinet hardware and fittings... more than 1500 items! Packed with newest scroll saw patterns, project ideas and money making plans. Enclose 25c (refunded with first order) to help pay mailing, handling cost. Write:

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NEW!!

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- New Line of Metal Legs
- Over 1,500 Items!

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9 h.p. B. & S. powered model S-23 shown is today's "MOST" Tractor. Compare with anything on the market at its \$475 price. Two other riding models (4 h.p. & 5 3/4 h.p.) and 3 h.p. walking model

also use complete line of "unit-design" tools. Full year guarantee; sold on 10 day money-back guarantee. Color FOLDER gives complete information and dealer's name. Send 10c for it today.

SPEEDEX TRACTOR 367 No. Freedom St.
COMPANY, RAVENNA, OHIO

POPULAR MECHANICS

Great for
outdoor gluing
on sea
and land!

Elmer's Waterproof Glue. Forms a bond stronger than the wood itself! The glue of glues for boats, furniture, sports equipment, window boxes—and every other outdoor job. Send stamped, self-addressed envelope for free copy of "Elmer's Guide To Good Gluing". The Borden Company, 350 Madison Ave., New York 17, New York.

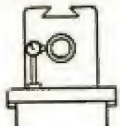


GENUINE ALNICO MAGNETS

AMAZING. PERMANENT. NON-ELECTRIC. HIGHLY PRACTICAL. Conduct interesting experiments. Hundreds of uses. Retrieve valuable steel items such as guns, tackle from fresh or salt water; tools from tanks & drains. **GUARANTEED.** Try any magnet one week. Money back if you are not well-pleased.

No. M-710 (Wt. 53 oz.) Has pull of 225 lbs. on steel block... \$18.00
No. M-625 (Wt. 70 oz.) Has pull of 125 lbs. on steel block... \$10.00
No. M-575 (Wt. 18 oz.) Has pull of 75 lbs. on steel block... \$7.00
No. M-500 (Wt. 13 oz.) Has pull of 50 lbs. on steel block... \$5.00
No. M-90 (Wt. 5 oz.) Has pull of 15 lbs. on steel block... \$3.50
No. M-300 Kit of Flat Bars 5 pairs (10 Magnets)... \$3.00
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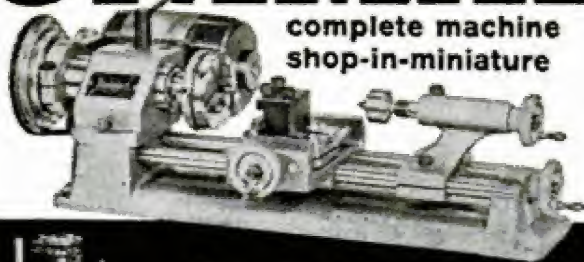
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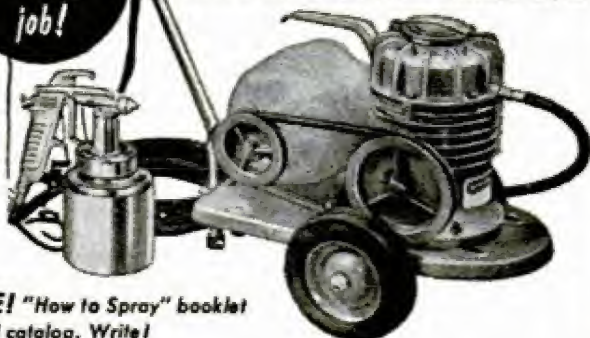
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least two big ocean liners have been tracked by radar and seen, rushing at night or in fog across the iceberg-cluttered Grand Banks area to Montreal at top speeds up to 25 knots. One slashed between the cutter and an iceberg. One drove at full speed through the fog without sounding her foghorn. Another liner sounded her fog whistle and reduced her speed from 18 to 11 knots, but only after an urgent warning of "ice ahead" by the Coast Guard cutter.

So far the Coast Guard has found no way to do away with its tough icy enemy. Destroyers and cutters have fired torpedoes at bergs, flung five-inch shells at them and slung demolition mines on long lines underwater against their icy faces. In each case the result was the same; there has been a big bang, and the berg has remained as imperturbable as the Sphinx.

Last June the Coast Guard conducted demolition tests with thermite incendiary bombs dropped from aircraft. Two hundred feet above the berg, a proximity fuse blasted the bomb open, and 22 thermite fire bombs spewed down against the icy cliff of the berg. There was a splatter of explosions that shrouded the berg in smoky steam. Sea birds on the icy pinnacles flew off in alarm—then came back. The plane dropped more bombs. But the iceberg remained intact. Nature had won again.

There is a commonly held theory that the presence of an iceberg can be detected by an unusual chill in the air; another theory is that the ocean water near a berg is colder and less salty than normal. Neither theory stands up. Icebergs have no significant effect on air and water temperature or on the degree of salinity of the water around them. The simple fact is that man, with all his ingenuity and resourcefulness, cannot control, regulate or entirely avoid the iceberg menace.

Tests last year by the Ice Patrol show that as a radar reflector an iceberg is only one sixtieth as efficient as a ship of comparable size and that even sea water is a better reflector than ice. This means that the clutter which ordinary waves reflect on a radar screen may so obscure a berg that the danger cannot be observed at all.

So the awesome tragedy of the *Titanic* still hangs over the area swept by the International Ice Patrol. And every year on April 14 the Patrol's bulletin to all ships in the North Atlantic concludes with this message: "RMS (Royal Mail Ship) *Titanic* 41 46N, 50 14W (her position at time of disaster), 14 April 1912. RIP (Rest in Peace)." ★ ★ ★

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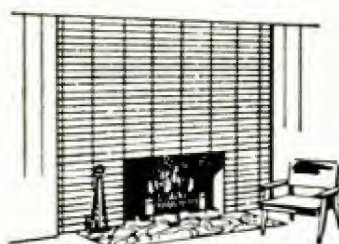
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The Army's Electronic Magic Shop

(Continued from page 85)

knew they could be controlled by radio in line-of-sight distances and that they could take pictures and bring the films back for processing.

"You're behind the times now," Snapp answered. "The drones we're working with can fly long-range missions. After they leave local radio control they fly a preprogrammed flight, changing altitude and direction according to preset instructions, eventually returning to local control.

"Meanwhile, they take pictures. The camera on the drone adjusts its diaphragm according to the amount of light, changes focus automatically depending on the distance to the ground, uses image motion compensation to offset the drone's speed and also uses powerful flash cartridges for after-dark work—all automatically.

"The drone develops its own pictures in the air and uses an optical transducer to convert the images into electrical impulses that are radioed back to base. Here a receiving camera converts the impulses into finished prints and at the same time produces a transparency that can be looked at in a viewer.

"This all happens in the space of three minutes while the drone may be several hundred miles away and traveling at twice the speed of sound at extremely high altitude!"

He went on to say that another new development is a TV system that doesn't blur at high speed and so can be mounted in a drone, radioing its pictures back to a viewing tube on the ground. The "side-looking" radar also can be mounted on a drone, as can infrared surveillance devices.

The Army still likes wire telephone circuits for some critical uses, but today is laying wire by helicopter at 70 miles an hour and also by short-range rockets. But for ordinary communication it is turning more and more to radio.

One of the newest innovations is a truck-mounted radio central that serves as many as 18 "subscribers" in a 10-mile radius. The system replaces the usual small wire telephone net and yet provides telephone service. In turn, it ties in with radio trunk circuits to other areas and even to land wires. It serves both fixed and mobile stations.

Recently an official who was touring the Proving Ground picked up the handset in his jeep, punched a series of buttons (that replace the usual dial) and asked radio central to connect him with an officer in Washington, D.C. The call went

(Continued to page 282)

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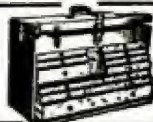
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through as if it were a routine operation, which it actually is.

The next step in improved communication in the field will be automatic electronic switching for either wire or radio nets. Ordinary automatic switching is too bulky and delicate to use in the field, so the Signal Corps is assembling automatic switching equipment that uses printed circuits and transistors. One 2½-ton truck will carry a complete central automatic station that provides instant switching for 200 lines. The equivalent commercial equipment would fill a building many times the size of the truck.

In an atomic war a field commander needs to have exact information about any atomic explosion, whether it is ours or an enemy's. The nuclear surveillance people at Fort Huachuca have worked out a method that detects an atomic blast at once and pinpoints its location within two miles of ground zero from up to 300 miles away. The method gives an indication of the yield of the blast. Fallout, rainout and the movement of any radioactive cloud can be calculated. Information like this is useful in correcting aim, assessing damage and determining contaminated areas which troops must avoid.

The Army figures that there are more than 74 complicated and time-consuming jobs that can be performed by automation far faster and more accurately than by humans. The tasks range from logistics and the making up of march tables to fire control and target analysis. Interrogation of prisoners—even language translation—quite possibly can be done by machines.

To study these possibilities the Army has installed one of the world's largest computer centers at Fort Huachuca. This Automatic Data Processing Department is using an enormous IBM 709 digital computer to help design small mobile systems that can move with the troops. Three sizes are envisioned—a large MOBIDIC (mobile digital computer) for major headquarters use, a medium-sized computer that could be transported by truck, and a smaller 87-pound package that fits in the back of a jeep for local jobs.

"Aiming a battery of guns might be one typical problem for the small computer," Lt. Col. Luther W. Murphy explains. "You feed in meteorology, the barrel life of the guns, obstacles in front of the guns, number of rounds available, location of our own forces, and other data. Within seconds the machine will tell you which guns should fire how many rounds of what type of shells, giving you the elevation and azimuth settings for each gun.

(Continued to page 284)

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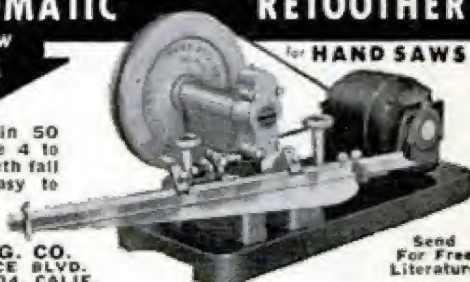
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Weather always has been a complicating factor in tactical operations and it's more important now than ever. Knowledge of local winds is important when flying a drone; information about winds aloft is necessary when launching a missile. So the Meteorology Department at the Proving Grounds is conducting basic research in micrometeorology, the small-scale weather variations that occur in small areas. Soil and vegetation, lakes and mountains and valleys all have local effects. Being able to predict the details of local weather is almost as important as large-scale forecasting.

In still another kind of weather support, a dozen teams from Fort Huachuca are stationed in various parts of the Western Hemisphere from the Greenland ice cap to Puerto Rico to study the effects of extremes in climate on the behavior of munitions, on stored materials and on types of clothing. Lt. Col. Lawrence R. Klar, meteorology chief, never knows what new kind of assignment will be handed his group. Recently they provided information that helped solve the puzzle of why a pilot's ejection apparatus sometimes doesn't work when the pilot needs to leave his plane.

It was suspected that the explosive cartridge that operates the ejection apparatus sometimes deteriorates because of the heat that builds up in a plane in hot weather. They found that inside temperatures on a hot day can climb as high as 250 degrees, hotter than boiling water. The answer was pretty obvious—an explosive is bound to deteriorate under a condition like this, and won't fire when needed. The solution is to replace the ejection cartridges at regular intervals.

Dozens of other projects are under way at Fort Huachuca. Some of the technicians are studying a special kind of night television that provides a good picture under moonlight alone. They are developing inertial navigation systems for drone aircraft, and terrain indicators to prevent a drone from flying into a mountainside if it gets off course. Air-droppable and backpack radio and radar jammers are being tested, too. The list is constantly changing.

In these days of intercontinental missiles and space craft a lot of people have forgotten all about the foot soldier. They don't realize that in the long run it is the troops on the ground that fight the battles and move in and occupy an enemy's territory. But the Army hasn't forgotten. That's why it is developing "futuristic" weapons for possible practical use in the future. ★ ★ ★



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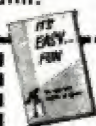
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ing-lot service attendants and doormen.

Seats are high and comfortable for four persons. The center tunnel will make any rear-seat middleman long for a saddle. Wheel housings intrude into the ends of the rear-seat back. Front seats are separate and are limited to two riders. Altogether, it is a four-adult machine.

Driver's seat back reclines too much for this driver. A small, nimble car like this encourages alert driving, but the seat back (British call it squab) is designed for relaxed repose.

Left-door armrest is in the way of the driver's elbow during fast maneuvers. Other demerits include a rear-view mirror that is so small it is virtually useless in today's phrenetic multi-lane expressway traffic.

On the boulevard, the Anglia rides well. But on a rough stretch, things are different. The high seat and the firm suspension combine to give you a feeling of sitting on top of the car rather than in it. This is particularly true on washboard and chuckholes. On such surfaces, the rear wheels tend to break loose and crab if speed is more than a fast trot.

On ice the rear end is light and if extreme care is not used in throttle application, the rear may swing about with a lump-in-the-throat suddenness.

Under normal conditions and with normal driving, the Anglia behaves quite properly. It will go where you aim it, without fuss.

The tiny engine has an amazing amount of lugging ability in fourth gear. It ambles away from 15 miles per hour in high, if you have the heart to insist. It may protest slightly and it may ping a bit (it has an 8.9-to-1 compression), but it will pull away without undue fuss and make you ashamed you were so demanding.

Inside the body, details are well thought out with a few minor exceptions. Upholstery is luxurious, no austerity shows.

One glaring exception is the bright metal trim used on the steering-wheel spokes. This applique is quilted sheet metal tacked (actually tacked) to the spokes in a most uncraftermanlike manner. Its sharp edges are exposed and could catch on a glove or a ring. The reflection of this brightwork in the windshield is annoying when driving into the sun.

Inadequate at near-zero temperatures, the hot-water heater does fine in normal winter weather. Controls are not marked at all and it takes considerable experimentation to determine how to operate it properly. The one-speed blower is noisy, especially on defrost. Identical with the heater

(Continued to page 288)

the "CLASS" of '60



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controls in appearance and also unlabeled is the hood release. It is located in the center of the dash where it can be pulled by a child or an unsuspecting stranger. Fortunately the hood is front-hinged so an unintentional release will not flip it through the windshield.

The odometer was optimistic by 1.1 percent, not bad as odometers go. For 101 miles on the reading, you travel only 100. The speedometer was not so accurate. At an indicated 70 miles per hour, true speed was 64.6, at 60 it was 55.4, at 50 it was 47.

Around town on smooth roads, it is most pleasant, offering just enough "foreignness" to be interesting, not enough to be strange. The horn button, for example, is diabolically concealed in the turn-signal lever. You push it in and the horn peeps—it doesn't blow, it peeps. The sound is so "peepy" as to be embarrassing (one way to cut down on pestiferous horn blowers).

Many amenities are provided at no extra cost. The rear side windows are hinged and push outward at the trailing edge to provide ventilation without stirring up a windstorm inside. There is a tenth-of-mile scale on the odometer. A wide and convenient package shelf runs the full width of the dash (incidentally, a safe, secure place to carry home that expensive bottle). The glove compartment is elbow deep and has a lockable door. There are two ashtrays in back, one in front. Rubber mats cover the entire floor and have thick felt underlayers for sound control. The trunk is surprisingly roomy for a car only 153.5 inches long.

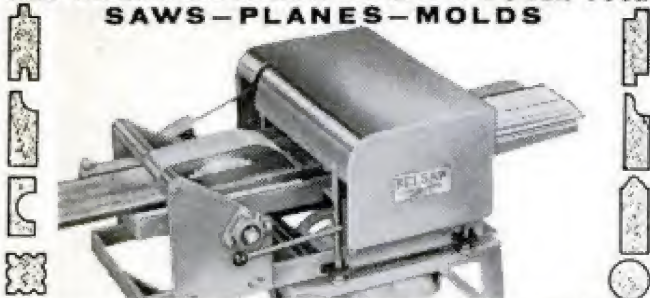
Backing and parking are easy. Nobody need be frightened of tight parking in this car. Windows are large and the neat, unpretentious tailfins act as handy guides. The driver can see the pavement within a few feet of the car, forward and backward, making it almost tragedy-proof in suburban, child-infested neighborhoods.

Foot pedals are smallish and require some getting used to, but after a day or so, the strangeness disappears.

Getting in and out of the front seat is easy. There is no stepdown nor wrap-around to battle. Climbing into the back seat (it comes only as a two-door) is not so easy, although both front seats pivot upward and forward as units (the seat back does not pivot separately) allowing plenty of foot room for entry to the rear. However, this arthritic seat design means that the front-seat rider must disembark to permit the rear passenger to enter.

Altogether, here's a car that is cute to look at, gentle to control and cheap to support—who can argue with that in either a wife or a car? ★ ★ ★

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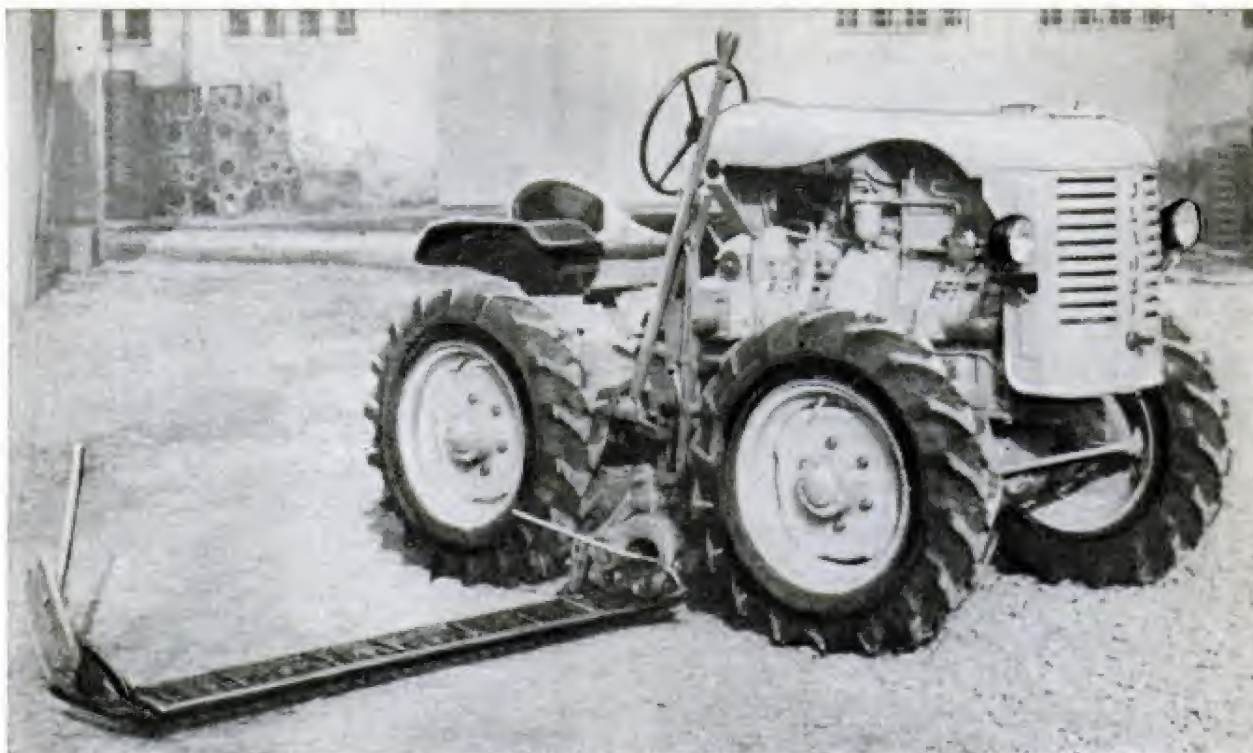
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(Page 22)



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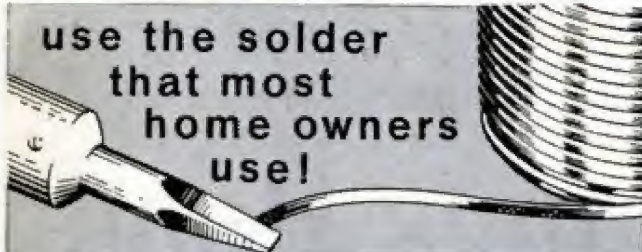


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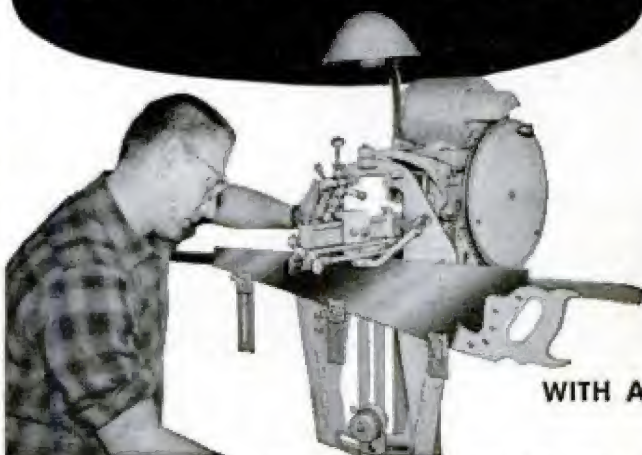
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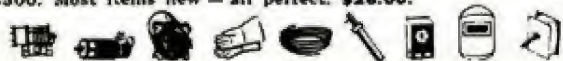


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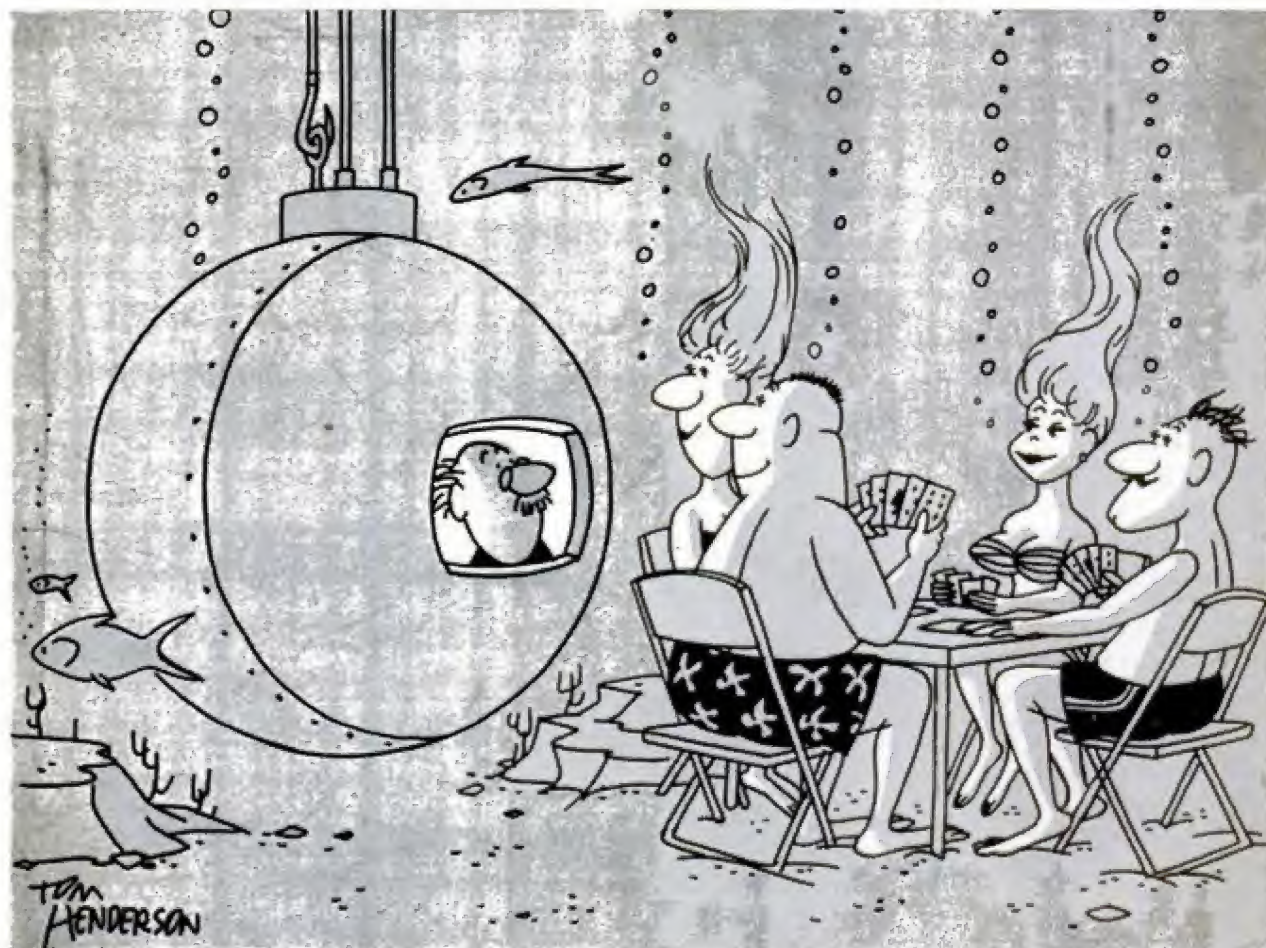
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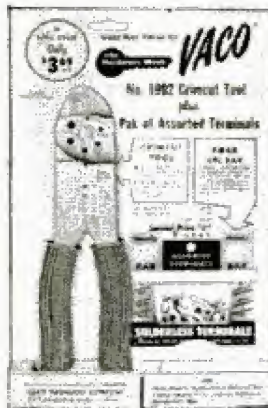
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 Ideal for garages, shops, on boats, jeeps, trucks, etc. Has 24 to 1 ratio through a worm gear drive. Has free-spool, pull-out clutch and a three-speed crank. Comes with 18 ft. of 3/16" high tensile strength steel cable. Lifts up to 2500 pounds. **375**
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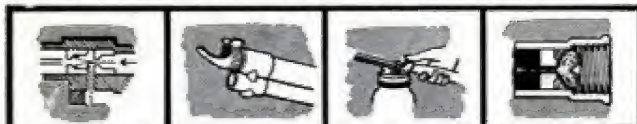
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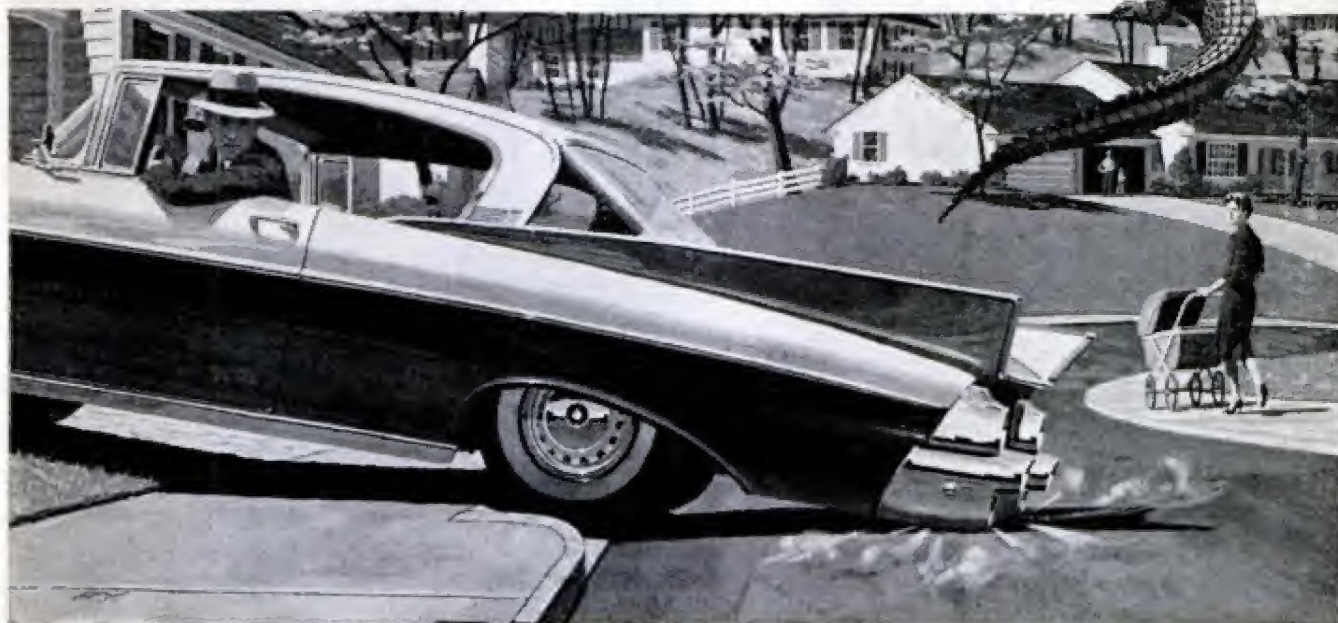
Moth Imported to Control Weed

Larvae of the cinnabar moth have been introduced to the West Coast in an attempt to control the spread of tansy ragwort, a poisonous weed that has been spreading among range grasses used to feed horses and cattle.

The United States Department of Agriculture imported the larvae from Europe and Great Britain, hoping that moths will emerge in the spring when the weed starts to form flower buds. The female moth lays its eggs on the underside of the weed's leaves and the larvae feed on the foliage and young buds. The experiment is underway in California, Oregon and Washington.

Tests conducted by the Department showed the cinnabar moth has no liking for any useful plants. The moth larvae also will not feed on safflower, a relative of tansy ragwort that is grown as a commercial oilseed crop.

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<input type="checkbox"/> Construction Engineering
<input type="checkbox"/> Highway Engineering
<input type="checkbox"/> Professional Engineer (Civil)
<input type="checkbox"/> Reading Struc. Blueprints
<input type="checkbox"/> Sanitary Engineer
<input type="checkbox"/> Structural Engineering
<input type="checkbox"/> Surveying and Mapping
DRAFTING
<input type="checkbox"/> Aircraft Drafting
<input type="checkbox"/> Architectural Drafting
<input type="checkbox"/> Drafting & Machine Design
<input type="checkbox"/> Electrical Drafting
<input type="checkbox"/> Mechanical Drafting
<input type="checkbox"/> Sheet Metal Drafting
<input type="checkbox"/> Structural Drafting
ELECTRICAL
<input type="checkbox"/> Electrical Engineering
<input type="checkbox"/> Elec. Engr. Technician
<input type="checkbox"/> Elec. Light and Power
<input type="checkbox"/> Practical Electrician
<input type="checkbox"/> Practical Lineman
<input type="checkbox"/> Professional Engineer (Elec)
HIGH SCHOOL
<input type="checkbox"/> High School Diploma | <input type="checkbox"/> Good English
<input type="checkbox"/> High School Mathematics
<input type="checkbox"/> High School Science
<input type="checkbox"/> Short Story Writing
LEADERSHIP
<input type="checkbox"/> Industrial Foremanship
<input type="checkbox"/> Industrial Supervision
<input type="checkbox"/> Personnel-Labor Relations
<input type="checkbox"/> Supervision
MECHANICAL and SHOP
<input type="checkbox"/> Diesel Engines
<input type="checkbox"/> Gas-Elec. Welding
<input type="checkbox"/> Industrial Engineering
<input type="checkbox"/> Industrial Instrumentation
<input type="checkbox"/> Industrial Metallurgy
<input type="checkbox"/> Industrial Safety
<input type="checkbox"/> Machine Shop Practice
<input type="checkbox"/> Mechanical Engineering
<input type="checkbox"/> Professional Engineer (Mech)
<input type="checkbox"/> Quality Control
<input type="checkbox"/> Reading Shop Blueprints
<input type="checkbox"/> Refrigeration and Air Conditioning
<input type="checkbox"/> Tool Design <input type="checkbox"/> Tool Making
RADIO, TELEVISION
<input type="checkbox"/> General Electronics Tech. | <input type="checkbox"/> Industrial Electronics
<input type="checkbox"/> Practical Radio-TV Engr'g
<input type="checkbox"/> Practical Telephony
<input type="checkbox"/> Radio-TV Servicing
RAILROAD
<input type="checkbox"/> Car Inspector and Air Brake
<input type="checkbox"/> Diesel Electrician
<input type="checkbox"/> Diesel Engr. and Fireman
<input type="checkbox"/> Diesel Locomotive
STEAM and DIESEL POWER
<input type="checkbox"/> Combustion Engineering
<input type="checkbox"/> Power Plant Engineer
<input type="checkbox"/> Stationary Diesel Engr.
<input type="checkbox"/> Stationary Fireman
TEXTILE
<input type="checkbox"/> Carding and Spinning
<input type="checkbox"/> Cotton Manufacture
<input type="checkbox"/> Cotton Winding and Weaving
<input type="checkbox"/> Loom Fixing Technician
<input type="checkbox"/> Textile Designing
<input type="checkbox"/> Textile Finishing & Dyeing
<input type="checkbox"/> Throwing
<input type="checkbox"/> Winding and Weaving
<input type="checkbox"/> Worsted Manufacturing |
|--|--|---|---|---|

Name _____ Age _____ Home Address _____

City _____ Zone _____ State _____ Working Hours _____ A.M. to P.M. _____

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A. SUPER POWER 2.9 AMP. 1/4" MIRROR FINISH DRILL powers all Twist-Lock attachments! (Model SD-2500)

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C. OSCILLATING SANDER. Sands, finishes, polishes any material satin smooth. (Model TLS-18)

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B. 5 1/2" CIRCULAR SAW . . . cuts 2 x 4's, bevels to 45°. Model TLC-500 . . . \$10.95

C. OSCILLATING SANDER . . . 25 square inches of sanding surface, patented knurled locking rollers. Model TLS-18 . . . \$10.95

D. JIG SAW . . . 7 saws in 1: scroll, rip, band, jig, coping, crosscut, hack saw. Bevels to 45°, cuts 2 x 4's. Complete with 3 blades. Model TLJ-58 . . . \$10.95

E. VERTICAL DRILL STAND . . . one of the finest ever made. Model TLV-27 . . . \$12.95

F. HORIZONTAL DRILL STAND . . . fastens securely to workbench for fine bench grinding. Model TLH-26 . . . \$2.00

G. POWER TRIMMER . . . 13" Swedish Blue Steel Cutter Bar, precision ground to stay sharp. Model TLT-13 . . . \$12.95

E. VERTICAL DRILL STAND precision drill press. (Model TLV-27)

\$1295

D. JIG SAW bevels to 45°, easily cuts 2 x 4's. (Model TLJ-58)

\$1095



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